

The Iron Age

A Review of the Hardware and Metal Trades.

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Anthracite Furnace for the North Jersey Iron Company.

The problem of cheapening the cost of producing pig iron has been seriously engaging the attention of furnace managers and owners during the present depression, and one good effect of the depreciated value of iron is the awakening of a livelier interest in the improvement of the various details of furnace plants. The engravings which we present this week show an improvement in the construction of blast furnaces, designed by Messrs. Weimer & Birkinbine, engineers, of Lebanon, Pa., and Philadelphia. The object of the arrangement is to reduce to a minimum the amount of material required in the construction of a stack, without destroying its efficiency or jeopardizing its permanency. The peculiarities of construction are the substitution of large cast iron housings in the place of the usual masonry piers, or cast columns, the housings being made higher than the ordinary piers or columns, thus exposing more of the bosh walls to the cooling influence of the atmosphere.

A cast iron mantle in the form of a hollow girder rests upon the housings and supports the masonry encasing the stack. The shape of the mantle permits of free admission of air for cooling.

The blast and water pipes pass through openings in and rest upon the housings, obviating the necessity of other supports. A spray pipe is also supported by the housings to project water against the bosh walls when required.

The bosh walls are of fire-brick, 30 inches thick, and are secured at each course by means of bands of inch square iron with T heads resting in slots in the housings. By this means the maximum amount of surface is exposed, and the minimum quantity of iron employed. To reduce the temperature of the crucible walls they are encased with boiler plate to the bottom of the tuyere openings to allow for six inches of washed gravel through which water can be allowed to percolate at will. Above the mantle the stack is built with a fire-brick lining and red brick casing with appropriate loom spaces. The red brick is secured by means of strong iron bands and improved devices, and a boiler iron casing surrounds the top where the "down take" leaves the stack. The top of the furnace is furnished with Weimer's patent charger (which prevents loss of gas when the bell is dropped) and the improved adjustable fence and top covering plates, all of which were described and illustrated in our issue of March 18, and to which reference has subsequently been made in these columns, as they have been applied to various furnaces.

Messrs. Weimer & Birkinbine, who make blast furnace construction a specialty, claim to have in this design materially reduced the expense of erecting a stack, by largely reducing the quantity of brick and iron consumed in its construction, without risking its permanence or economic working.

Mineral Wealth of Russia.

The St. Petersburg journals publish the text of the speech recently delivered by the Grand Duke Constantine Nicolaiwitsch, honorary president of the congress of delegates of the iron trade, at the closing session of this congress. The following is a translation of the speech: I rejoice to be able to state that the debates of the congress have been very animated. This fact is the best proof of the necessity of an exchange of ideas on a question so important as the development of the iron manufacture,

Your discussions have fully confirmed the fact that there exists in all parts of the empire an immense wealth of iron ore. Some have sought to prove that the principal deposits of ore are found in the Oural; others affirm that the South of Russia is rich in iron and in coal deposits. The owners of works in the west speak of the richness of their country in coal and iron; and those in the north put in the foremost rank Finland and the northern parts of Russia, where very considerable deposits of ore are found in the mountains and in the lakes,

This is the order of the day, because the railways, the telegraphs, steam navigation, manufactures, and also agriculture urgently demand iron. A century and a half after Peter the Great, the founder of the Russian mineral industry, a new era opened for metallurgy, the era of the Emperor Alexander II, the restorer of civil and economical life in Russia. The national activity is apt to comprehend the requirements of the day, and is, on its side, exerting itself to direct its forces. The proprietors of iron works founded during the reign of

sails will receive an impetus, and when our merchant flag shall float over distant seas; in a word, when our country, peopled by 80,000,000 of toilers, shall set itself to work with the aid of iron at a cheap rate and good machines! At the present time our frontier districts, separated from each other by vast spaces, have each their especial local life, and their original development. I am, however, firmly convinced that iron will, in the end, not only reduce distances, but ever bring regions nearer together. It will create common interests; in a word, it will be

taken counsel of men who were competent to give evidence upon the subject. Probably some two or three years hence we may hear that the commission is thinking about a report, and that in another year it will appear! It is a fact, nevertheless, that there are many persons who could furnish information to the commission, and whose information would be of infinite value. Theorizing in respect to the causes of fire at sea is useless. What is wanted is the results of past experience. These, when well considered, and combined with scientific deductions, may lead to the institution of effectual plans of fire prevention on the high seas.

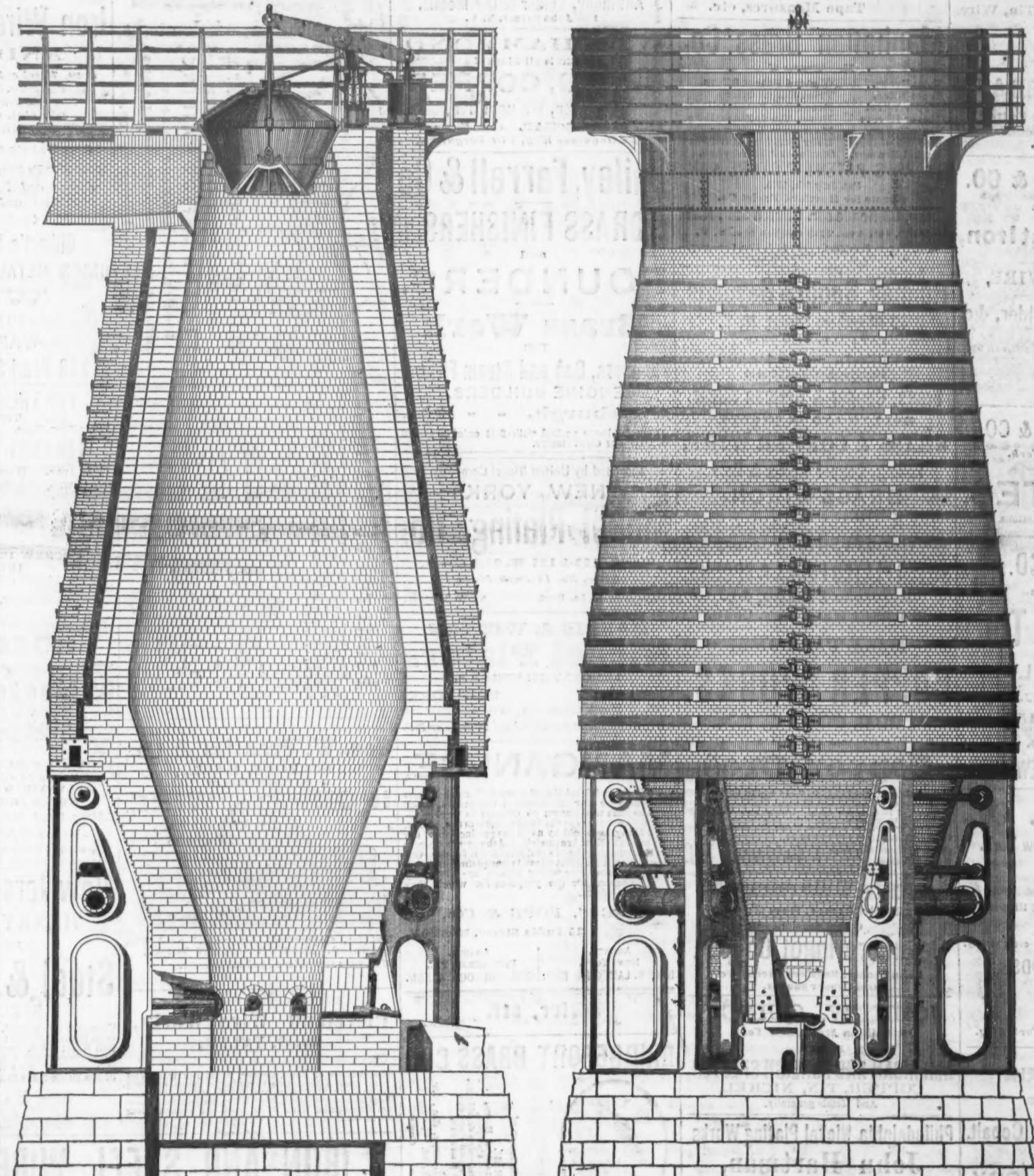
Spontaneous combustion, however, takes place on land as well as on the ocean, and thus opportunity is afforded for a consideration of the whole question, even by those who do not "go down to the sea in ships, and do business on the great deep." For ourselves, without wishing to arrogate superior knowledge on the subject of spontaneous combustion, we shall endeavor to indicate a few points which may not be unworthy the attention of Mr. Childers and the commission over which he presides. The general cause of coal becoming ignited in the hold of a ship is the liberation and accumulation of gases escaping from them. The best preventative, therefore, is the extraction and diffusion of these gases. In order to accomplish this there should be laid horizontally between, say every three feet layer of coal in the hold of a ship, a series of perforated pipes meeting in the center and then having an uptake to the deck. The central pipe and branches should embrace the full area of the hold, and, as it were, permeate throughout it. The main pipe should then be connected to a small centrifugal pump or fan, driven by the donkey engine on deck or by a crank propelled by manual power. This arrangement, together with a gas regulator, such as that invented by Mr. Ansell for revealing the existence of fire damp in coal mines, would be found invaluable in preventing fire or giving warning of danger.

If, in spite of such precautions, fire may have broken out in the hold of a coal ship, the air and gas suction might be shut off and through the same mains water could be "flushed" among the burning coals; the water in this case would be impartially distributed amongst the coals as that combustion would cease instantaneously.

Perforated pipes from deck to keel through the midst of the cargo might be serviceable in some cases, but the greatest preventive of fires at sea would, undoubtedly, be the adoption of a plan of sucking out incipient gases from the hold by mechanical means, such as we have described. If the Royal Commission desires to arrive at a practical conclusion it will do well

to ponder over what we say.

At the Ravensdale Iron Works—the first English establishment to successfully introduce the Danks puddling furnace—there lately occurred an accident to the anvil block, on which the immense masses of puddled iron produced by the Danks furnace are hammered. The anvil block that is broken weighed 95 tons. A new cupola is already erected close to the bed of the block, with the view of casting a new anvil block, which is to weigh 115 to 120 tons. The metal will be run into the mold made in the bed of the block. This levitation casting will be completed in twelve or fourteen hours from the time the furnace begins to melt the large mass of metal required for its production.



ANTHRACITE STACK FOR THE NORTH JERSEY IRON CO., WEIMER & BIRKINBINE, ENGINEERS.

and where immense forests supply wood for heating. In the center of Russia, foundries have existed for a long time, and, if the south find the means of supplying cheap coal to this region, the iron production will be increased tenfold. In a word, Russia presents throughout its surface a soil rich in iron ore. I am convinced that the moment of great activity in the domain of the iron trade has now arrived. Enterprise in different branches of the industry of a nation is very simultaneous. Russia commenced by occupying herself exclusively with agriculture; then came a long development of private industry for the production of articles of the first necessity; factories of cloth, and cotton mills, were next seen to rise; steam navigation followed; latterly the system of railways and telegraph has been developed; now it is the turn of the iron manufacture,

Peter the Great are far from complaining that their ancestors took the initiative in the mineral industry, while, at the same time, laying the foundations of their present wealth. It will be the same with the new era—the present. Those who will take the initiative in the establishment of iron works and engineering establishments, and will not give in at the first difficulties, which are inevitable, will be the founders of a solid prosperity for their descendants. Already, at the present time, the consumption of this metal is enormous in Russia. What will it become when the face of the country will be covered with a net-work of railways, when all our navigable water ways shall be traversed by iron steamers, when the agriculturist will employ only mechanical appliances, when the use of machines in various manufactures shall become universal, when the construction of ves-

the source of a perfect similitude in conditions of economy, and the whole of the life of the immense Russian family. Such is the enormous importance of iron! I will say, in conclusion, that I shall watch with the most lively interest the development of works in Russia, and that each of your successes will constitute a new joy for me, which will be, at the same time, a new joy for the whole of Russia.

Spontaneous Combustion.

The London Iron Trade Exchange says: It is now some three months since that a Royal Commission was formed for the purpose of inquiring into, and reporting upon, the spontaneous combustion of coal in ships. The proceedings of that commission have not as yet been published, nor are we aware that it has

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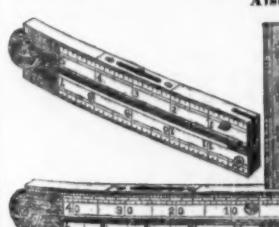
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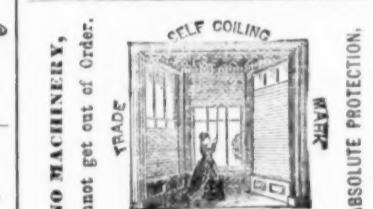


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Trades Unionism the Great Enemy of Industrial Development.

The genial methods of the trades union people, when they have an argument to enforce or a point to gain, have had frequent picturesque illustrations during the present summer, on both sides of the Atlantic. These illustrations are worth the consideration of the general public, because under the new plan of voting themselves a "vacation," these people will doubtless have more leisure in the future than heretofore to still further improve those "vacations," so that no one who stands in the perilous relation to them of capitalist or employer shall be exempt from the system of terror which they have now reduced in its individual application almost to an exact science.

To begin with, take the mild-mannered strikers in the Scotch city of Dundee. The latest mail papers received here contain a report of a great meeting of the brethren there to resist the proposed ten per cent reduction of wages. The rhetoric employed on the occasion was hardly of a kind to be expected from the usually sedate and contemplative Caledonian. There was a touch of the Communist about it befitting the Faubourg St. Antoine rather than "bonny Dundee." Resolutions were passed pledging all not to return to work; and it was suggested by one of the operatives that "any who gave in should not only be scouted by his fellow workers, but should be put in a sack and thrown into the Tay"—a sentiment which elicited an outburst of commendation. Putting people "in sacks" and "throwing them into the Tay" may be a very good trade union notion, but it is not an original idea. It is, in fact, a plagiarism from the ancient Venetians and the Turks, who in that way used to get rid of obnoxious rivals or unfaithful spouses. As there are some twenty thousand operatives in that Dundee strike, however, and as, at least, one-third of these are understood to be secretly opposed to the movement, it is probable there will be an active demand for sacks before the summer "vacation" is at an end—at the same time that the navigation of the Tay is likely to be materially interfered with by the mortal remains of the anti-society men who are thus, by wholesale, to be "put out of the way."

Coming nearer home, take now the case of the society men recently engineering the great strike in the Pennsylvania coal regions, as a further illustration of their picturesquely persuasive ways when a "capitalist" or an employer is to be taken in hand. President Gowen, of the Reading Railroad Company, in the course of an argument before a committee of the Pennsylvania Legislature, submits a list of some 200 outrages upon persons and property by the class of persons alluded to in the Schuylkill and Shamokin regions alone, the purpose of all cases being to intimidate workmen who were willing to labor at the best prices they could get, without reference to society dictation. A few of the more flagrant instances of this odious tyranny may be mentioned: At the Ben Franklin colliery—the employees of which were perfectly satisfied with their wages, and were working peacefully and contentedly—the torch of the mercenary was applied to the breaker at night. These men having families to support, working there contentedly and peacefully, were driven out of employment by a few dangerous men, simply for the purpose of preventing them from earning their daily bread. Mr. Gowen says he had some interest in the subject of the amount of their wages, and he asked the owner of the colliery what his miners were actually earning at the time when they were prevented from working by the burning down of the structure in which they were employed, and he told him the lowest miner on his pay list earned \$60 a month and the highest \$130, and yet, although these laborers were peaceful, law-abiding men, they were driven out of employment by an incendiary fire. At another colliery, within five or six miles of this, a band of 20 or 30 men, in the evening—almost in broad day light—went to the breaker, and by force drove the men away and burnt the structure down. It belonged to a poor man; the savings of his lifetime were probably gone, and his own employees, who had nothing against him, and who were perfectly willing to work, were thrown out of employment and probably remain out of employment to this day. It is only six or eight weeks ago that the men in the Reading collieries signified their willingness to go to work; they told the company they were tired of the strike, and wanted it to start the collieries; and when operations were accordingly resumed, a band of 500 or 600 men appeared and drove them away from their employment, with the exception of those at one colliery. Again, it is but a few weeks ago that the president says he received a letter from a miner, a man who had worked in the mines for thirty-six years, the father of a family and the owner of a household, stating that the writer feared that he and his companions were in the wrong, that they had made a mistake, and that they were anxious to return to work. Mr. Gowen wrote him a letter and endeavored to show him what he supposed to be the folly of the course which his associates had been pursuing. The man acknowledged receipt of the letter, intimating that he was convinced and that the men would return to their employment. It became known through the post office, however, that this man had received a letter from the president of the Reading Railroad Company. He was charged with that as a heinous offence. He had a great deal of personal independence of character, and he met his accuser face to face and asked them whether in this country a man had not a right to receive a letter to whom he pleased and to read it. The courage with which he met them succeeded for the instant, and he left to go to his home, but when he reached his home at night he found there the anonymous notice: "Leave

this country within twenty-four hours or you are a dead man." Of course he was then powerless—for who can defend his life from the secret assassin? The man left—left his family and remained absent until he hoped the affair would be blown over and until the men should return to their senses and he could safely go back to work. These are but a few of the innumerable instances of the same kind of terrorism related by the witness, and it is no wonder, therefore, that he exclaims:

"Gentlemen, we meet next year to celebrate the centennial anniversary of the Declaration of American Independence. We expect to attract to Philadelphia a concourse of the citizens of the whole world. We shall point with gratified pride to an empire built up under republican forms of government. We shall show them to an asylum where the abject, and the humble, and the poor from all climes and from all lands have found a refuge. We shall tell them that the shackles have been stricken from the limbs of millions of slaves. And when we glory in this prosperity, and when we boast of all this freedom, let us not forget that almost within the shadow of Independence Hall tens of thousands of citizens are subject to a tyranny and a despotism such as neither Khan nor caliph ever exercised, and such as in the wildest dream of power never was conceived by sultan or czar."

What avails it to these men that they are ready and willing to work? Of what avail is it to them that we offer them work? Of what avail is it to them that the wages that they could earn would amount to \$100 or \$150 a month? They cannot work; they dare not work; to attempt to do so is to invoke destruction.

"Why, but a few weeks ago we were obliged to conduct the business of the railroad company in the mining region under an armed force. Every passenger train that passed over the road was preceded by an engine with an armed posse. The locomotive engineer, ever foremost at his duty and unflinching at the post of danger, standing with his left hand on the throttle valve and his right upon a pistol, as his train passed through dark glades or by deep defiles, where almost every tree and every rock concealed an armed assassin thirsting for his life. We were obliged to send men armed to the teeth to protect their fellow men in the right to labor; and this police force had to be lowered and passed down the inclined planes over which you passed and which you saw, where the human freight is suspended by a few threads of wire rope. At a time when a number of these officers were about to go down one of these inclined planes, it was found that some cowardly assassin, with an axe, had cut the wire rope in three or four places, not so deeply that the danger should be discovered by the eye, but rather that it should be hidden until the strain was upon it—cut for no other reason than to precipitate to a sudden and terrible death those brave men who were there, in obedience to orders, to protect their fellow laborers in the right to earn their daily bread."

In reading statements of this character, one can scarcely realize that the Commonwealth in which these outrages were perpetrated has a regularly established government, whose first of all duties is to protect the lives and liberties of its citizens. Hence the conviction is again forced upon the mind that but for the inexplicable apathy of its chief magistrate no such terrorism could have been possible. President Gowen, we observe, is silent on this vital point—and we can well understand his silence; but, now that the Legislative Committee has been put in possession of a full history of the case, the public are entitled to anticipate such action at the hands of the next General Assembly as will not only give the Governor to understand that it is high time he had a clearer perception of his duty, but that a repetition of these trades unions or "society" outrages upon individual liberty will never again under any circumstances be possible. The admonition ought to have come before this, but it is better now than never.—*Daily Bulletin*.

Launch of another Pacific Mail Steamship.—The Pacific Mail steamship City of Sydney was launched Aug. 5th from the yard of the Delaware River

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To Wm. Roemer, Newark, N. J.—A catch plate for bag locks consisting of the plate A, catch a, perforated lips b, b, and bent handle d, made in one piece of metal.

GOVERNOR FOR STEAM ENGINES.

To G. C. Sims, Lawrence, Mass.—In combination with the eccentric F, its tubular shaft, and

of metal.

the carrier or slide D thereof, applied to the fly-wheel, and provided with the weight, as de-

scribed, the spring H, fastened at its middle to the slide, and at its ends connected to the fly-

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To E. Andrews, Williamsport, Pa.—The

handle has a longitudinal cylindrical central

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and the upper part has a left hand screw thread cut

upon it, and at right angles to said opening another

opening, in which is placed a round ended nut, having a corresponding screw

thread. The saw is attached to the handle by

means of a slot formed in the plate near its end, to

receive the hooked part of

the rod, in connection with a chambered and adjustable cap, provided with a slot,

in which the back of the saw rests, and ferrule having shoulders and a tapering

neck to fit said cap.

By turning the handle to the right the saw is firmly clamped in place.

1. The combination, in a handle for cross-cut

saws, of the straining rod F, with its upper end

cutter with left hand threads, and a corresponding

threaded nut, C.

2. The movable cap E, provided with a central

opening and a groove upon one side of the same

across its greatest diameter.

3. The movable cap E, provided with a central

opening and a groove upon one side of the same

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4. The movable cap E, provided with a central

opening and a groove upon one side of the same

across its greatest diameter.

5. The movable cap E, provided with a central

opening and a groove upon one side of the same

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6. The movable cap E, provided with a central

opening and a groove upon one side of the same

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7. The movable cap E, provided with a central

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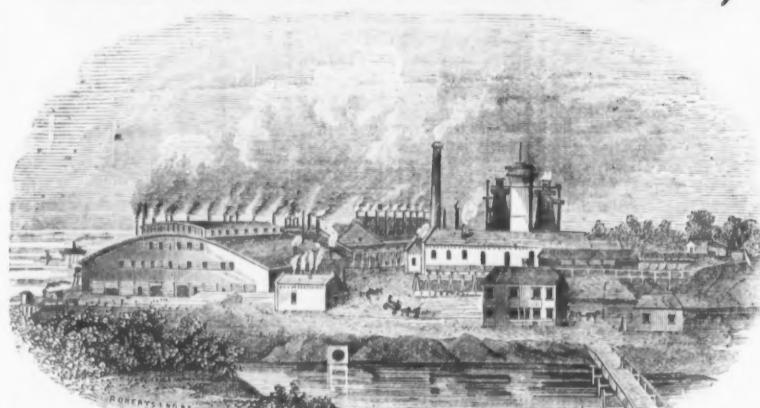
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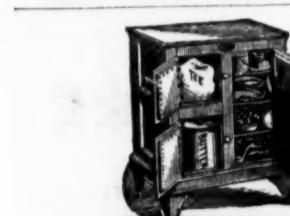
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Iron Making in Northern New York— Catalan Forges.

The opinion is entertained, even among the best informed of our iron makers, that the Catalan forge is a thing of the past, and references to the forges of Northern New York are generally in the same spirit that notices would be made by a traveler should he chance to find a family clothed with the primitive fig leaf. It therefore may be interesting to know that the Catalan forge represents a large manufacturing interest in what is generally known as the ronddack section of New York. About 40,000 tons of iron are produced annually, which will be sold this year for about two and a half millions of dollars; but even this does not convey an accurate idea of the business interest, as the forge owners manufacture almost everything they use in producing the iron.

There are about 25 establishments in this part of New York for making iron by this ancient process, and two new concerns have commenced work within the past year. I shall endeavor to give some account of the works of J. & J. Rogers Iron Co., one of the oldest and largest of these establishments, from which an idea may be formed of the other works of similar character.

This company commenced the manufacture of iron about 40 years ago, and have continued it uninterruptedly since that time. Their principal office is at Ausable Forks, Essex county, New York, but they have two branch offices, one at Black Brook and one at Jay, each some five miles distant. They own nearly 80,000 acres of land, and employ about 2000 men as laborers and jobbers, and produce about six thousand tons of iron per annum, which is made from about 12,000 tons of separated ore, and requires in its reduction some 2,000,000 of bushels of charcoal, made from about 40,000 cords of wood, which necessitates the clearing of 1000 acres of forest per year. The ore used is magnetite ($FeO + Fe_2O_3$) found in close mechanical combination with feldspar rock. In mining this ore a Rand & Waring air compressor, one Waring and three Ingersoll drills are used, and though in use for two years, neither compressor nor drill have caused any trouble, the company having good mechanics and a machine shop supplied with the best modern tools, where repairs are speedily and intelligently made. Before separation this ore presents the following analysis:

Prot. of iron	22.62
Per. of iron	48.21
Silica	26.15
Alumina	1.14
Lime and magnesia	20
Titanium	31
Loss, &c.	1.07
Total	100.00

This company make nearly all of the charcoal used in making these billets from timber cut from their own land. Cutting and hauling the wood from 1000 acres of land, burning it into coal and hauling the coal to the forges, makes a large business. Roads have to be built through all this new land. The logs are saved and taken to one of their three saw mills where they are cut into lumber, which is mostly sold in the Albany markets.

This company have a foundry in which all of their castings are made. They also have a grist mill, a lath mill and a shingle mill. They burn lime, make brick, do all their own building, make their own wagons and nearly all of their own machinery, including lathes for their machine shop, keep three stores in which they retail about \$400,000 worth of goods per year, do nearly all their own teaming, keep 30 odd miles of plank road, and I do not know how much dirt road, in repair, and still have energy enough left to lose considerable money every year at farming.

After being mined, the ore is drawn to large open kilns, where it is roasted, about 300 tons being piled upon 25 cords of wood, which causes the stone to loose its hold upon the ore. It is then put into troughs with grate bottoms, where it is stamped, and after stamping and screening, it is passed into sieves through which water rises from the bottom, and so adjusted that the ore, having a greater specific gravity than the sand (ore, G. 5—sand, G. 2½), will sink, and pass through holes in the bottom of the sieve into a trough, while the sand is raised by the water and carried off.

The ore thus separated is taken to the forges. The forges are made with cast iron plates, so as to form a kind of box 27 inches by 24 inches and 18 inches deep. This depth is reduced some 4 inches by the insertion of a "bottom plate" cast hollow, through which water is kept constantly running. A current of water also passes through the plate on the side of the box at which the tuyere enters the fire. Three arched pipes pass over the fire inside the chimney, by which the blast is heated sufficiently to set fire to a hard wood stick. After a few minutes' exposure, the air thus heated enters the fire at one side near the bottom through a water tuyere, with a pressure equal to about 1½ inches of mercury. The chimneys are 20 feet high. Every four to six of these fires furnishes work for one hammer, which is a cast iron tilt hammer weighing 5 tons, and run by an undershot water-wheel at the rate of about 80 strokes to the minute. These measurements vary somewhat in different forges, but I do not think the difference material.

After the fire is kindled the fire-box is piled full of charcoal, and as soon as it is sufficiently hot the blower commences gently throwing ore over the fire, which has the effect of deadening it down. This shoveling of ore is repeated at short intervals for three hours, when the iron, which is called a loop, is ready to be taken out. During this operation the cinder is drawn off quite frequently in the form of liquid silicate of iron, through tap holes near the bottom of the box. The ore, as it is distributed upon the burning charcoal, is quickly heated and deoxidized, and doubtless highly carbonized at the same time. In this condition it readily works its way through the charcoal into the bottom of the box or fire. While the ore is being heated and deoxidized, the silica which is contained in the ore in the form of mechanically combined feldspar, and which was not entirely removed at the separator, combines with a portion of iron and forms an impure silicate of iron, which is fusible at a much lower temperature than either the iron or the original silice. This silicate or cinder forms a liquid mass or bath in the bottom of the box, into which the iron falls. Carbon has a greater affinity for silicate of iron than it has for metallic iron, and this cinder bath undoubtedly takes a great deal of carbon from the iron that falls into it, and tends to render the iron more malleable.

The tendency of iron made by this process is to absorb too much carbon, and consequently it is the effort of forge owners to make their iron as soft as possible. One of the great difficulties in making this iron is to prevent the bloomers from running the fires too hot. When a great deal of coal is piled upon a fire, and it is allowed to get very hot before it is cooled down by throwing ore upon it, bloomers say the fires are run hot, and while a larger yield is produced in this way, the iron is much harder than when the fire is kept at a uniform temperature. An increase of blast tends to make harder iron, and the malleability of the iron is also dependent upon the size of the tuyere and its position in the fire; also largely upon the skill and faithfulness of the blower.

After the fires have been run for three hours, the loops are "dug out" with long bars, and placed on a hand cart and wheeled to the hammer. These loops weigh about 350 pounds; they are then "shingled" or hammered into the form of a rude cylinder, when one end is placed back in the forge fire to be reheated while the next loop is being made. As soon as it is hot it is taken out and hammered to 4 inches, the unsound or ragged end being cut off and thrown back into the fire to be run over, and then one third of the remainder is cut off and forms the head of the loop is then reheated and hammered and cut into two billets; these billets each weigh about 100 pounds. It takes two tons of separated ore and from 300 to 350 bushels of char coal to produce a ton of iron.

For the last ten years this iron has been almost exclusively sold to makers of crucible cast steel, the greater part of it having gone to Pittsburgh. Most of it was sold in the form of billets, though some of it was rolled into bars.

An analysis of billets made by Mr. Otto Wuth, of Pittsburgh, gives the following results:

Silicium	0.021
Phosphorus	0.034
Sulphur	trace
Carbon	0.959
Iron	99.539
Slag	1.460
Total	100.005

This company make nearly all of the charcoal used in making these billets from timber cut from their own land. Cutting and hauling the wood from 1000 acres of land, burning it into coal and hauling the coal to the forges, makes a large business. Roads have to be built through all this new land. The logs are saved and taken to one of their three saw mills where they are cut into lumber, which is mostly sold in the Albany markets.

This company have a foundry in which all of their castings are made. They also have a grist mill, a lath mill and a shingle mill. They burn lime, make brick, do all their own building, make their own wagons and nearly all of their own machinery, including lathes for their machine shop, keep three stores in which they retail about \$400,000 worth of goods per year, do nearly all their own teaming, keep 30 odd miles of plank road, and I do not know how much dirt road, in repair, and still have energy enough left to lose considerable money every year at farming.

But to return to the iron. This seems to have but one objection, the want of uniformity in its percentage of carbon. Billets made by the same workman vary with each other, and the carbon is not uniform throughout the same billet. This want of uniformity is not a serious objection to cast steel makers, who melt the iron and add additional carbon, and with the care that is now bestowed upon it, it is not very detrimental for most purposes for which the first quality of bloom iron is used. Its unusual freedom from impurities more than compensates for its want of absolute uniformity in hardness.

A specimen of common billet recently tested by the Keystone Bridge Co. at Pittsburgh, broke at a tensile strain of 72,180 pounds to the square inch. Heretofore this iron has been in great demand, but its sale has lately been affected by the panic which has reduced the production of cast steel, while the make of iron in the Catalan Forge has steadily increased during the last few years. It appears now that an auxiliary market must be found for this iron or some of the forges now in operation must cease to work. In the hopes of a more extensive market, I would state that, in addition to their other works, the J. & J. Rogers Iron Company have a large new mill built on the site of their mill that was burned last December. In this mill they make all sizes of iron, and are also making a scrap or refined iron which is of superior excellence. This iron is made by rolling billets into bars, cutting and piling the bars, breaking down and re-rolling, which not only softens and refines the iron, but distributes any unevenness that may have existed in the original billet and produces an iron of unusual toughness. But the great cost of fuel and labor makes it exceedingly doubtful whether the refined iron can be made profitably. It certainly cannot be made and sold in competition with American puddled iron, and the only hope is that it will be some extent supersede Norway bars. It seems to equal Norway iron in quality, and can be purchased much cheaper.

It must be added that in the midst of the chronometer room is a stove, and suspended over it is a large iron tray, which may almost be termed a frying pan for watches. It is really a king of purgatory through which they must pass before reaching the paradise of a captain's cabin! Here the chronometers, doomed to the highest trials of virtue, do penance for a time in artificial heat. When this is over and due note has been taken of the rates, or pulse-beats of the victims, they are suddenly plunged into broken ice, the change of rate being again observed.

Thus they are made to

"feed by turns the bitter change
Of fierce extremes—extremes by change more
Fierce
From beds of raging fire to starve in ice."

Who shall state the extent of service rendered to navigation by the great care exercised in respect of chronometers at the Greenwich observatory?

A curious point in connection with the deviation of the compass on iron ships has attracted much attention on the part of scientific men. It is now believed that some of the sudden and hitherto unaccountable changes in the deviation of the compasses of such ships—which are often unsuspected until alleged as the only conceivable cause of the vessel's running ashore—are the effects of an unequal and varying distribution of heat over the iron hull. Sudden slight changes of compass deviation, not exceeding five degrees, have been noticed on iron ships on our American coast, and these are now attributed to changes in the hull, ocealed by the vessel's passing from warm to cold water, and the reverse. The warm temperature of the Gulf Stream, taken in connection with the cold counter-current, may account for many of the suspected compass errors on iron ships, and the devising of a remedy for this would be an excellent subject for study on the part of some enterprising inventor.



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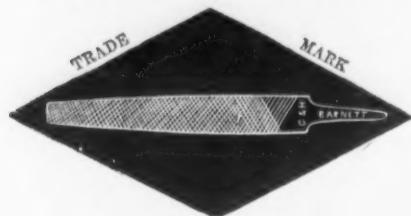
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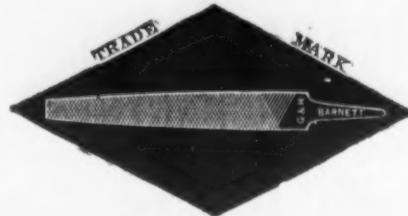
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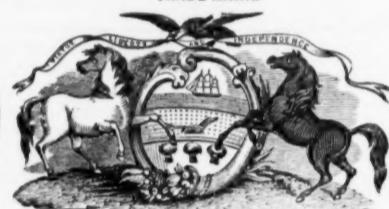
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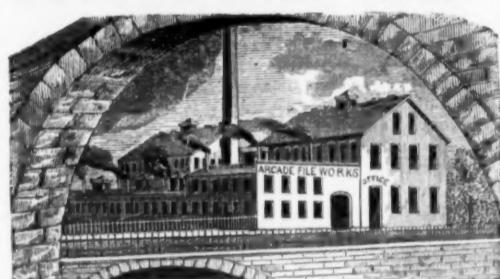
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Stubs' Goods,
Hair Felt,
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Emery Cloth,
Hand Drills,
Iron Punches,
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Files,
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Railroad & Machinists' Supplies.

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ELIAS G. HELLER. GEO. E. HELLER.
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We invite the attention of the trade to our Celebrated
American Horse Rasps and Horse Rasps
made from the very best
American Steel, all cut by
hand, and we warrant them
equal to any other made in
the market. For the informa-
tion of persons unacquainted with our goods, we will
state that every file or rasp manufactured by us, since
our establishment in 1866, have been stamped "Hellier &
Bro." though commonly called the "Heller Rasp."
All Rasps not stamped as annexed diagram are not
ours. We warrant them a lot of reliable, and if
not as represented they can be returned, or held subject
to our order, free of all charges. For sale by the leading
Hardware Dealers in the United States.

BACKUS BROTHERS,
Manufacturers of
The Backus Water Motor,
Cor. Wright St. and Ave. A,
Bet. Chestnut St. & S. Broad St. Depots, Newark, N. J.

What They
will do.

These Motors are
adapted to running light machinery,
such as Coffee
Mills, Flour Mills,
Frosters, Lathe's,
Drug Mills, Church
Organs, Sausage
Cuts, Ice cream
Freezers, Eleva-
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chines, and every-
thing else of like
similar power, in
cities or towns
where there are
Water Works.
And the best "Motor" in the world for family sewing
machines. Send for Circular.

Established 1816.**Peter A. Frasse & Co.,**

95 Fulton Street, New York,

SOLE AGENTS FOR

Thomas Turner & Co.'s Suffolk Works,
SHEFFIELD.**FILES AND HORSE RASPS,**

And Importers of

P. S. STUBS' FILES, TOOLS & STEEL,**W. J. Davies' Sons' London Emery Cloth,**
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Superior Hand-Cut

FILES AND RASPS,

MADE FROM IMPORTED STEEL. EVERY FILE WARRANTED.

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JOHN ROTHERY'S**Celebrated Hand-Cut FILES,**

Made of Best English Cast Steel.

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FLOWER POT BRACKETS, BIRD CAGE HOOKS, &c., &c.

**BUILDERS' HARDWARE.**

Patent Zinc Stove Platforms.

G. WEBSTER PECK,

Manufacturers' Agent. 110 Chambers Street, New York.

H. HAMMOND
Manufacturer of
CAST STEEL HAMMERS
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A. FIELD & SONS, TAUNTON, MASS., Manufacturers of COPPER & IRON TACKS, TINNED TACKS;

SUPERIOR SWEDES IRON TACKS, for Upholsterers' Use, Saddlers' Supply, Card Clothing, etc., etc.

American and Swedes Iron Shoe Nails,

Zinc and Steel Shoe Nails, Carpet, Brush and Gimp Tacks, Common and Patent Brads, Finishing Nails, Annealed Trunk and Clout Nails, Hob and Hungarian Nails, Copper and Iron Boat Nails, Patent Copper Plated Tacks and Nails,

Fine Two Penny & Three Penny Nails, Channel, Cigar Box & Chair Nails, Leathered Carpet Tacks, Glaziers' Points, Etc.

OFFICES AND FACTORIES AT TAUNTON, MASS. WAREHOUSE AT 78 CHAMBERS STREET, N. Y.,

where may be found a full assortment of Tacks, Brads, &c., for the accommodation of the New York Wholesale and Jobbing Trade.

Any variations from the regular size or shape of the above named goods made from samples, to order.

Hopkins & Dickinson Manufacturing Co., FINE METAL WORKERS, Works, Darlington, N. J.

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Hand Made Locks and Real Bronze Hardware.

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FOR HOTELS, OFFICE BUILDINGS, STORES,
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Eureka Self-adjusting



SCALES.

Have a patented attachment for ascertaining the tare of a dish or other receptacle used in weighing without the use of weights or loss of time.

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THE CANADIAN BANK OF COMMERCE.

Capital - - \$6,000,000, Gold.
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Buys and sells Sterling Exchange, makes Cable Transfers, grants Commercial Credits, and transacts other Banking Business.

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HOISTING Machinery

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CRANE BROS.
MFG. CO.,
Chicago.

BUSINESS ITEMS.

NEW YORK.

R. L. Howard, Buffalo, recently shipped to Vermont a hydraulic press of his manufacture, weighing nine tons and capable of a pressure of nearly 1100 tons. It will be used in a paper mill.

Night and day with 175 hands is the way they do things at the Syracuse Iron Works, Syracuse. The works cover two acres, and have a capacity for turning out 6000 tons per year of band and hoop iron, bars, rods, scrolls, oval, horse shoe iron, &c. They have in use four double puddling furnaces, one single one and six heating furnaces. The steam-power consists of two engines of 150 horse each, with several smaller ones. The yearly consumption of coal is 10,000 tons, 4000 to 5000 tons of pig iron and 1000 to 1500 tons of scrap iron. Their band and hoop iron is largely sold in the Eastern States, where it is very popular. Charles E. Hubbard is secretary and treasurer of the company.

Over 300 "Little Giant" turbine water-wheels, manufactured by the Merrell Brothers, Auburn, are now in use. J. C. Wilson has bought the right of making these wheels in Canada, and is now manufacturing them at Picton, Ontario. The Merrell Brothers have now been running four years, and are at present employing 25 hands.

PENNSYLVANIA.

New machinery is being put in to increase the capacity of their works by the Pittsburgh Hinge and Butt Factory, located at Beaver Falls. The factory is running to its full capacity, with orders two months in advance.

The Hazard Manufacturing Company, of Wilkes-Barre, has just filled an order for two wire ropes, one 2000 and the other 1800 feet long. They were shipped to Virginia City, Nevada, this week, and are to be used for hoisting ore from a silver mine.

The Mount Hope Furnace, of the Messrs. Grubb, in Lancaster county, has resumed operations after lying idle for five years.

The employees in some of the departments of the railroad shops at Altoona are now working twelve hours per day. This is necessary in order to hasten the completion of several improved postal cars at present in course of erection.

CONNECTICUT.

The Farist Steel Co., of Windsor Locks, will start their works in about a week. These works have been closed since the recent coal strike occurred, at which time it was impossible to get the kind of coal required for the manufacture of steel. They have orders ahead to keep them busy for some time, and no doubt will have all they can possibly do. The proprietors of the above works are also proprietors of the steel works in Bridgeport, under the firm name of Farist & Windsor, at which place they have recently greatly increased their facilities for getting out more work than heretofore.

Although they are working considerable overtime, they cannot keep up with their orders. If business should continue with them as it is at present, they will be compelled to make further additions to their already extensive works, so that they can fill their orders promptly.

An electric magnet, weighing 1800 pounds, was lately shipped to West Point by Wallace & Sons, Ansonia. The magnet has a sustaining capacity of 60 tons.

In consequence of dull times the Pequot Mill, at Norwich, has suspended operations.

The working force at the Consolidated Road's car shops, in New Haven, has been greatly reduced on account of dull times.

NEW HAMPSHIRE.

Blood's Locomotive Works, at Manchester, will be run for the present only five days in a week. About 150 workmen are employed there now, which is less than one-fourth required to run the works at full capacity.

RHODE ISLAND.

The Providence Tool Company have just sent off another large lot of the rifles ordered by the Turkish government. The manufactory is kept running day and night, and the rifles are being turned out quickly and in large numbers.

MASSACHUSETTS.

The Washburn Iron Works, at Worcester, are closed for an indefinite period, on account of hard times and a lack of orders. This stoppage will throw several hundred workmen out of employment.

The tack factory at Assonet will resume operations this month, with an increased number of machines.

The American Tool Company runs its foundry at Hyde Park two-thirds of the time with half the usual hands.

OHIO.

The Cleveland Rolling Mill Company have decided to increase their facilities for making all kinds of iron by introducing, within the next ninety days, the Siemens-Martin process for making soft steel for boiler plate and other purposes. The capacity of this addition will be two furnaces, seven tons each, with gas producers and other appliances for smelting. They have also decided to put up a new building over the old mill, entirely of iron. There are now employed around the old mill 2030 men, independent of the plate mill, and the pay roll amounts to \$100,000 per month.

The steam riveting machine, Cleveland, recently erected in the new boiler shops of the Fulton Iron Works, performs its duty rapidly and effectually.

The Edge Tool Company's building, in Leetonia, is nearly completed.

A knitting machine factory is to be established at Norwalk, by the Curtiss Manufacturing Company, with \$90,000 capital.

The Cuyahoga Iron Works, Cleveland, lately made a lot of heavy peat machinery for a party of Cleveland capitalists, who intend to manufacture peat at Morrison, Ill., by the hydraulic pressure process. The machinery has already been shipped to its destination.

The Cleveland Rolling Mill Company are

carrying out their intention of making steel boiler plate by having erected two Martin-Siemens furnaces, of seven tons capacity each.

INDIANA.

The Eagle Machine Works, Indianapolis, have made large shipments during the past month of the separators and portable engines to St. Louis, for the Western trade, and to different parts of Kentucky and other Southern States. They are having some difficulty in obtaining a sufficient number of workmen in their wood-working department.

The foundry and machine shop of W. S. Lincoln, and the plow handle factory of J. H. Tucker & Co., at Logansport, were partially burned July 29. Loss, \$10,000; fully insured.

Steel Rails on the Pennsylvania Railroad.

The Pittsburgh Commercial says: During the present year the Pennsylvania Railroad Company has purchased and laid down, on its various divisions, over 20,000 tons of steel rails. The main track between this city and Philadelphia is now laid entirely with steel, and the New York division will have no iron rails by next April. The company first commenced to lay these rails in 1860, and every year's experience demonstrates their economy. The immense traffic which now comes over this road makes the life of an iron rail a short one, and in certain localities it would be worthless in less than six months.

Iron rails, indeed, have been in continuous use for over 30 years, and a section of such a rail was lately shown at a meeting of the Franklin Institute; but then these rails have lain much of that period on sidings where there have been no heavy traffic. A good steel rail will stand the wear and tear of continuous use on the Pennsylvania road for from 7 to 12 years.

Mr. Brown, Chief Engineer of Maintenance and Way, has in his office the section of steel rail which has stood the severest test a rail can receive, and that was in the Pittsburgh yard, over which the heaviest trains are continually being shifted. After seven years' use, on a curve, there seems no reason why there should not be two or three more years' service in it.

Experience has shown that a modification of the usual form of the T rail would make it more serviceable, and within the past year all the rails rolled for the company have been rolled with wider flanges and thicker head, without increasing the standard weight of the rail, 67 pounds to the yard, the material being taken from the shank or upright section. The form of the shank has been changed, the section representing the frustum of a cone, instead of being elliptical. This is the form the head always assumes after use, the flanges of the wheels wearing off the bulge of the elliptical head. The flange has been widened, which will prevent the rail, to some extent, from cutting into the ties, which suffer more from this than from decay.

The present amount of traffic over the road would make it almost impracticable to renew the track with iron rails as often as they would wear out, as from the great number of trains there would be no opportunity. The 20,000 tons of steel rails purchased will lay 207 miles of single track, and it is the intention to renew all the main track with steel. The sidings will be of iron. The first cost of steel, as compared with iron, is now about 50 per cent. greater.

In the year 1871, the work of straightening several very objectionable curves in the track between Philadelphia and Downingtown was commenced; the object being not so much to save distance as to decrease the wear upon the rails and rolling stock. This work was commenced on the section between Ardmore and Rosemont, the length of the new route being 24 miles. This was the most important of all the charges to be made.

In 1871 a curve was straightened between Rosemont and Villanova, the new route being 5200 feet long, and a section west of Radnor, a distance of 1600 feet. In 1872 a change of 3200 feet was made near Radnor, and in 1873, between Malvern and Glenloch, two sections were straightened, one of 4100 feet, and the other of 5280 feet; a third section of 4313 feet, between the same points, was commenced in that year, and was completed in 1874.

The financial crisis coming on in the fall of 1873 put a stop to this kind of work, and changes in the three short sections between Eagle and Paoli, and one between Glenloch and Valley Creek, which had been surveyed and staked, were left for a more favorable state of affairs.

In all these changes the road bed and bridges have been constructed for four through tracks. There are already four laid to Overbrook, and they will be constructed as rapidly as the traffic increases.

There are already 1536 miles on the main or Pennsylvania division; 722 miles on the New Jersey division, and 499 on the Philadelphia and Erie division, making in all 2807 miles of single track.

The Columbia (Pa.) Spy says: Messrs. Becker & Reinhold, proprietors of Chickies Rolling Mill, had a most successful run for the month of July. With two double and one single furnace, equal to the capacity of five ordinary single furnaces, they made in 25 working days, 2800 tons of muck bars, of superior quality. The stock used to effect this result was the Chickies brand of pig iron, from Messrs. E. Haldeman & Co's. Chickies furnaces, and bituminous coal from the Morrisdale vein. Taking into consideration the capacity of the mill and the hot month of July, we doubt whether this can ever be exceeded in this State. No extra men were employed during the month, one puddler and his helpers working each single furnace respectively. The maximum charge was five hundred pounds to a heat. The average waste was 6% per cent., 1750 pounds of coal being consumed for a gross ton of muck bars. This unusual result, in the midst of the unprecedentedly hard times, reflects much credit upon Messrs. Becker & Reinhold as well as on Messrs. E. Haldeman & Co.



Cutlery.

John Russell Cutlery Co.,
FACTORIES AND OFFICE,
TURNERS FALLS, MASS.

Manufacturers of
TABLE CUTLERY,
Butcher, Painters' and Druggists' Knives
IN GREAT VARIETY

Extra Hard Rubber Handle Table Cutlery of our own Manufacture.
Fine Ivoride Handle Table Cutlery, very White and Durable.
Sample Office, 77 Chambers St., N. Y.

NORTHAMPTON CUTLERY CO.,

Manufacturers of all kinds

American Table Cutlery,
Cook, Butcher, Shoe and Hunting Knives.
Sole Agents for Rogers' Cutlery Co.

Plated Forks and Spoons.
THEODORE WEED, Manager, 45 Murray Street, N. Y.

FRIEDMANN & LAUTERJUNG,
MANUFACTURERS OF

Pen and Pocket Cutlery, Solid Steel Scissors, F. & L. Shears, Razors,
Russia Leather Straps, Oil and Water Hones, &c.

Sole Proprietors of the renowned full concaved patent

"ELECTRIC RAZORS."

Also Agents for the **BENCALL RAZORS.**

American Table Cutlery, Butcher Knives, &c.
14 Warren Street, NEW YORK. 423 N. Fifth Street, ST. LOUIS, MO.

TABLE KNIVES AND FORKS OF ALL KINDS,
AND EXCLUSIVE MAKERS OF



And the "Patent Ivory" or Celluloid Knife. These Handles never get loose, are not affected by hot water, and are the most durable knives known. Always call for the Trade Mark "MERIDEN CUTLERY COMPANY" on the blade. Warranted and sold by all dealers in Cutlery, and by the MERIDEN CUTLERY CO., 49 Chambers Street, New York.

THE MILLER BROTHERS CUTLERY CO.,
Manufacturers of
PATENT FINE PEN & POCKET CUTLERY

WEST MERIDEN, CONN.
The only knives made that are put together in such a manner that there is no strain on the covering or frail part of the knife. We warrant our knives equal in cutting qualities and workmanship to any made, and are acknowledged by English makers as the **Best American Knife.** We also make

NICKEL & SILVER PLATED POCKET KNIVES
which will not rust or become discolored when used as a Fruit Knife, and their cutting qualities are equal to any other knife. Orders filled from the factory, and in New York by **Messrs. J. Clark Wilson & Co., No. 81 Beckman Street** (who have a full stock of all patterns always on hand), and also by **Messrs. G. B. Walbridge & Co., No. 99 Chambers Street.**

Naugatuck Cutlery Co.,
Manufacturers of FINE

PEN and POCKET CUTLERY.

FULLER BROTHERS, Sole Agents, 89 Chambers and 71 Reade Sts., N. Y.

HAMMER & CO.,
Branford, Conn.,
Manufacturers of the following Patented Articles of

MALLEABLE IRON:

Hammer's Adjustable Clamps,
Hammer's Malleable Iron Oilers,
Hammer's Mall. Iron Hand Lamps,
Hammer's M. I. Hanging Lamps.
For Sale by all the principal Hardware Dealers.

Malleable Iron Castings
Of Superior Quality made to order.



ESTABLISHED 1852.

NEW YORK KNIFE CO.

MANUFACTURERS OF SUPERIOR

Table & Pocket Cutlery,

WARRANTED TO BE MADE OF THE BEST MATERIAL.

WALKILL RIVER WORKS,

Walden, Orange Co., New York.

THOS. J. BRADLEY, President.

AMERICAN PEN AND POCKET KNIVES,
MANUFACTURED BY **PEPPERELL,**
Aaron Burkinshaw, AB MASSACHUSETTS

My blades are forged from the best Cast Steel, and warranted. To me was awarded the GOLD MEDAL of the Connecticut State Agricultural Society; also a Medal and Diploma from the Mass Mechanics' Ass'n Sept., 1860. Illustrated Catalogues sent on application.



KANN & SONS MFG. CO.

Manufacturers of Albeta & Britannia

TEA and TABLE SPOONS,

Caster Frames, Ladies, &c.

88, 90 & 92 N. Holiday St., Baltimore, Md.

Roman & Co. MANUF. OF PAD LOCKS 141-145 RR AV. NEWARK, N.J.

Roman & Co. Established 1837.

Manufacturers of Patent Brass Pad Locks for

Railroads and Switches. Also, Patent Stationary R. R. Car Door Locks. Patent Pins

and Sewing Machine Locks.

141 to 145 Railroad Avenue, NEWARK, N.J.

Illustrated Catalogues sent on application.

FURNESS, BANNISTER & CO.

Manufacturers of

Fine Table CUTLERY.

Cor. Nassau & Sheffield Sts., NEWARK, N. J.

FOR SALE.

At the Russell & Erwin Mfg. Co., 45 Chambers St., N. Y., the New England Sash Lock. It has been well tried before putting it on the market, and gives perfect satisfaction. It prevents windows from rattling, the dust from getting in, and the door from being forced, and window fastening can be. This is the only true Fastener that locks securely both upper and lower sash at any point.

Stretches the wire each way, is tightened with a common wrench, is self-fastening at each half turn, and the spring is so strong and durable.

Sold at hardware stores, Washington, D. C., and Northrop, sole manufacturers, Chicago, Illinois.

Agents: Hibbard & Spencer, Chicago; Excelsior Mfg. Co., St. Louis; John Nazro & Co., Milwaukee; George Tritsch Deaver; Nelson & Co., Burlington, Iowa.

Illustrated Catalogues sent on application.

hooks fit loosely in grooves in the gates, the latter are free to revolve.

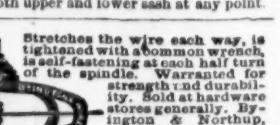


Fig. 4.—ELEVATION OF BRASS MOUNTED IRON VALVE, FLANGED.

When the gates are lowered and the valve closed, the ball part of the nut presses upon the rounded cavity surrounding the deeper cavity into which the trunnion enters, and this pressure is uniformly transmitted to all points upon the circumference of the gate. As stated before, this pressure is not upon the center, but a little outside of it; and from the shape of the gate, there is no possibility of its springing at any point. All are proved at high pressure, generally 300 lbs. per square inch. These valves are regarded with great favor by those who have used them, and possess the elements of a wide and permanent popularity.

The Eddy Patent Valve.

We present herewith some illustrations of the Eddy patent valve for use in steam, gas, water, air pipes, etc., or in any place where valves or gates are needed. These valves are made by the Mohawk & Hudson Manufacturing Company of Waterford, N. Y. (just above Troy on the Mohawk and Hudson Rivers) under letters patent issued July 1, 1873. These are double gate valves (like many others) but different in the way the gates are moved, and the

valves are made of brass, iron, &c., with flange, hub or screw ends.

In addition to the regular styles of valves,

the company make a quick opening valve, Fig. 3, which is coming into use to a considerable extent. It is well adapted for a blast valve at

iron furnaces, for it is so tight that no gas can pass it when closed, and furnace men would do well to examine it.

These valves are made of all sizes and styles

—brass, iron, &c., with flange, hub or screw ends. The same company also manufacture fire hydrants of their own and the Bailey styles.



Fig. 1.—ELEVATION OF IRON VALVE—BRASS MOUNTED, SCREW ENDS.

pressure brought upon them in opposition to the water or stream.

Upon the stem of the valve (as shown in Fig. 2) is a nut of irregular form, having the lower part somewhat like a ball, upon which are small bosses, or trunnions, which project into corresponding cavities in the back of the gates. Upon these trunnions, which do not reach to the base of the cavity in the gate, the

gates move with it, and as the seats are somewhat inclined toward each other, they are at once relieved of pressure, and move very easily.

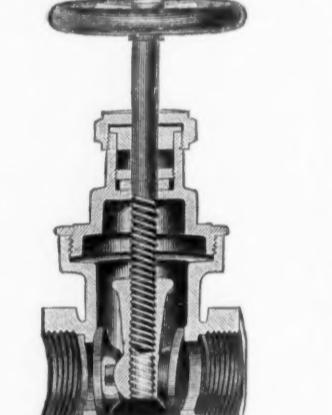


Fig. 2.—SECTION OF IRON VALVE, BRASS MOUNTED, ED, SCREW ENDS.

latter is free to revolve; thus presenting itself in different positions, and when wear begins, making it more uniform than when a gate always seats in the same position. As the nut on the stem rises and falls, the gates move with it, and as the seats are somewhat inclined toward each other, they are at once relieved of pressure, and move very easily.

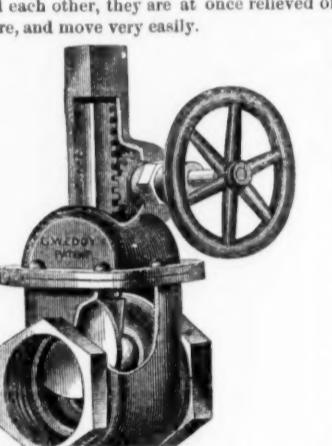


Fig. 3.—ALL BRASS SLIDING VALVE FOR QUICK OPENING.

In order to prevent the current of water, etc., from causing the upper part of the gate to incline too far out and rub against the case, the large sizes, 4 inch and upward, have a hook arrangement, not shown in the cuts, which allow sufficient motion for self-adjustment to the seats, but prevent too much; and as these

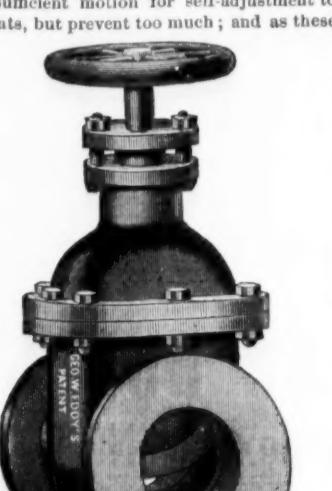


Fig. 4.—ELEVATION OF BRASS MOUNTED IRON VALVE, FLANGED.

When the gates are lowered and the valve closed, the ball part of the nut presses upon the rounded cavity surrounding the deeper cavity into which the trunnion enters, and this pressure is uniformly transmitted to all points upon the circumference of the gate. As stated before, this pressure is not upon the center, but a little outside of it; and from the shape of the gate, there is no possibility of its springing at any point. All are proved at high pressure, generally 300 lbs. per square inch. These valves are regarded with great favor by those who have used them, and possess the elements of a wide and permanent popularity.

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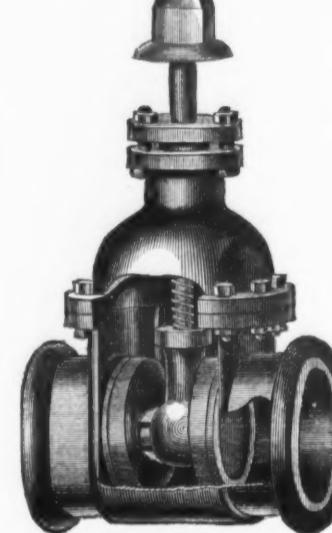


Fig. 5.—IRON VALVE, BRASS MOUNTED, HUB ENDS FOR GAS AND WATER MAINS.

iron furnaces, for it is so tight that no gas can pass it when closed, and furnace men would do well to examine it.

These valves are made of all sizes and styles

—brass, iron, &c., with flange, hub or screw ends. The same company also manufacture fire hydrants of their own and the Bailey styles.

A Kentucky Railroad.

The Chattanooga Commercial has the following: The Cincinnati Commercial has scolded a good deal about the trustees of the Cincinnati Southern Railway building a road "parallel with the Kentucky Central," from Covington to Lexington, instead of buying that line. To have built a "parallel road would have been an achievement in engineering beyond the powers or even the conception of Lovett and Gunn, and their whole corps of engineers. Consider the undertaking of laying down lines parallel with those which compose Spangler's signature, and the reader will have a faint idea of the difficulty. The Southern line is a little more than 21 miles shorter than the Central, from Covington to Lexington, and the Central is but a hundred miles long. From end to end it is a system of double back action patent reverse curves; and the greatest triumph of railroad skill ever known is displayed on it daily in running first-class passenger trains at the enormous speed of 12 to 15 miles an hour.

It used to be a standing joke among the soldiers that they could jump off the Central cars, pick a fillet of blackberries, and cut across the country and get on again. An inquirer, who has figured carefully through the problem, informs the Cincinnati Trade List, "that the extra cost of operating the Kentucky Central for 20 years, considering none of its notorious defects, but the extra and unnecessary length, will exceed the total cost of the construction of the Cincinnati Southern from Lexington to Covington." So far as the course of the Central line goes, Licking River engineered it; and that river is crookeder than a ram's horn. The road follows the meanderings of the river to Paris, and there the river runs out, or into the ground, we don't know just which. So the able engineer, having lost his guide, made a bold original dash off to the West, and failed to get as many curves in his last 20 miles, for the reason that he had no crooked river to model them by. But he did run round several small hills, cow pastures and barns; and even this short section of the Central very fairly vindicates his skill in going the longest way to reach an objective point.

Belgian Coke Ovens for the Vinton Furnace.

Messrs. Bradford & Rader, proprietors of the Vinton Furnace, in the Hanging Rock district, Ohio, are putting in a Bradford separator and Belgian ovens, with a view to coking their own coals. Should the experiment be successful, it will cause great changes in the iron trade of the Hanging Rock region, as timber suitable for charcoal is becoming scarce, and the whole region abounds with bituminous coal hitherto unused in the furnaces, owing to the amount of sulphur contained in it and the difficulty of cementing it in coke. Before ordering the improvements, Messrs. Baucroft & Rader sent a lot of their coal—the run of the mine—to the Cambria Works, at Johnstown, where the Belgian ovens of Messrs. McLanahan, Stone & Bailey are in operation. Here it was made into a coke said to equal in quality to the best Connellsville. If this is true, there is no doubt of the success of the experiment at the Vinton Furnace, which has hitherto made iron with Connellsville coke as good as hot blast charcoal. The ovens will be in operation in October next, and the result is awaited with great interest by the furnace and coal land owners of the region.

H. D. SMITH & CO., PLANTSVILLE, CONN.

Patent Embossed Steps.

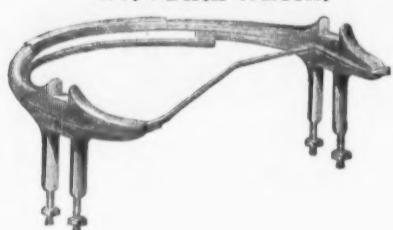


Leaf Pattern.



Established 1850.

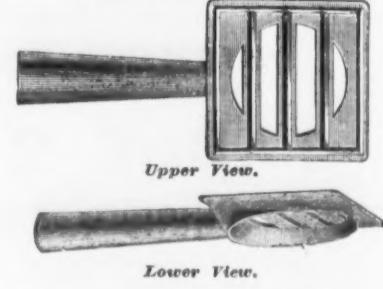
No. 6 Fifth Wheels.



1871 Pattern Shaft Couplings.

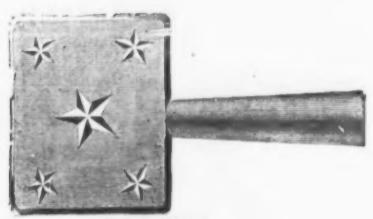


Patent Cross Bar Steps.



Upper View.

Lower View.



Star Pattern.



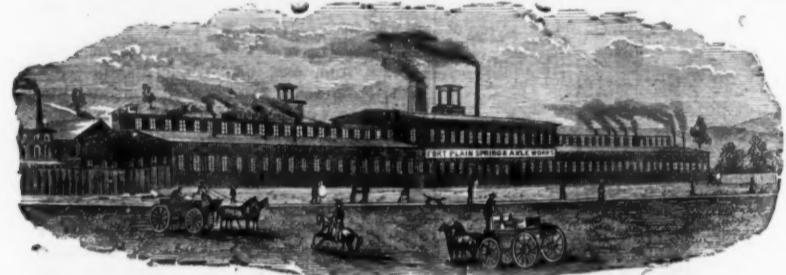
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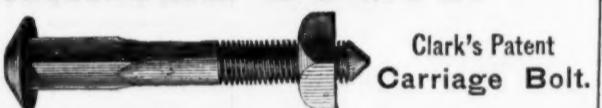
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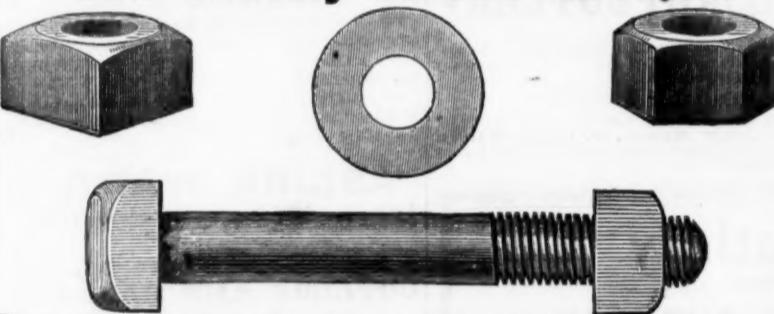
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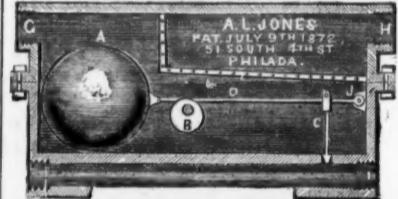
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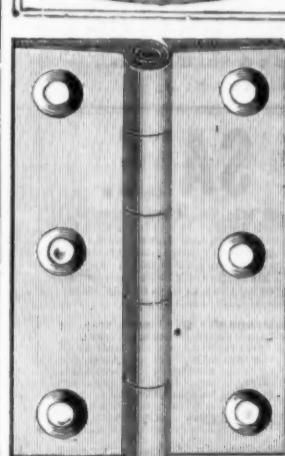
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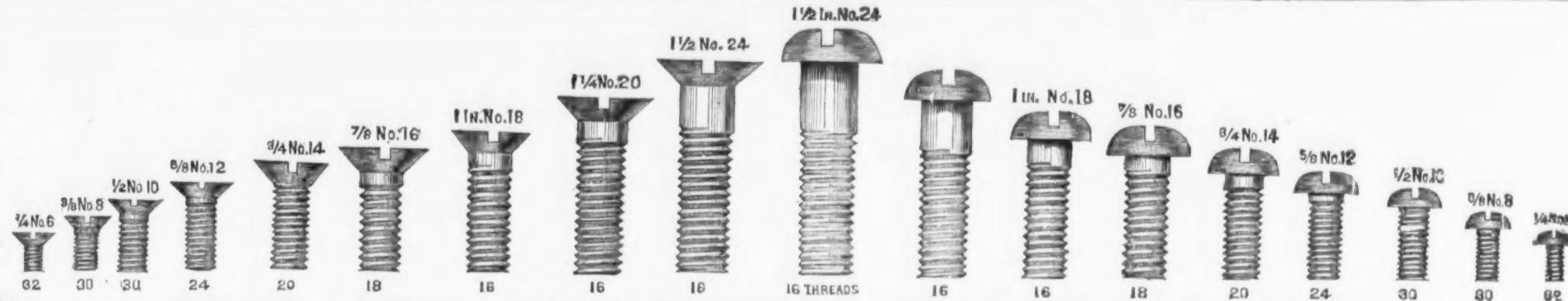
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The Iron Age.

New York, Thursday, August 12, 1875.

DAVID WILLIAMS - Publisher and Proprietor.
JAMES C. BAYLES - Editor.
JOHN S. KING - Business Manager.

NEW YORK, January 2, 1875.
Until the 1st instant the postage on newspapers was paid by subscribers at the office where the paper was received, the yearly rates on the different editions of *The Iron Age* being as follows: Weekly, 40 cents; Semi-Monthly, 40 cents; Monthly, 24 cents.

Under the provisions of the new postal law, which went into effect on the 1st instant, prepayment at the office of mailing is required, at the rate of two cents per pound for the Weekly, and three cents per pound for the Semi-Monthly and Monthly, which will make the postage as follows on the different editions: Weekly, 50 cents; Semi-Monthly, 30 cents; Monthly, 15 cents.

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Weekly Edition.....\$4.50 a year.
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Thirty-first Page.—New York Wholesale Prices (concluded).

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The Care of Tools.

Before the manufacture of tools of all kinds became a distinct and extensive branch of business, it was necessary for mechanics in all trades to understand the art of making their own tools. In the old books on metal working much attention was given to this matter, and in the writings of famous artisans of the olden time—Benvenuto Cellini, for example—we find that the directions for the making of tools are as explicit and comprehensive as the directions for using them when made. In Cellini's description of his method of preparing thin metal plates for raised work, he diverges at each stage to tell his readers how to fashion the tools they must use, even to the details of sharpening. In the writings of the artisan monks of the middle ages, we find the same care displayed in

describing all but simplest tools in common use. Until the beginning of this century, and even within the memory of our oldest mechanics, the best artisans were pretty much always the best tool makers, and much of the excellence of their work was no doubt due, in some measure, to the superiority of their implements. With the development of the tool business, the mechanic was relieved almost wholly from the necessity of fabricating, or even devising, the implements of his craft. He can now buy better tools than he can make or have made for him; while the introduction of labor saving machinery into the tool factories has so lessened the cost of their products, and at the same time so improved their quality, that his cheapest and best source of supply is usually the nearest hardware store.

But the change which thus relieved the mechanic of the necessity of being a blacksmith, has not stopped there. The men who have devoted their lives to tool making have anticipated the wants of all classes of artisans to such an extent, and so improved the quality of tools, that in most instances the mechanic has all he can do to learn how to use them to the best advantage, and, what is equally important, to take proper care of them. Many of the tools in common use have assumed the character of machines. Among these may be included drills of various kinds, presses and dies, pipe cutters and threaders, lathe attachments which were formerly simple tools but which are now almost machines in themselves, punches, shears for iron and steel, and many other appliances which need not be specially mentioned. These are unquestionably great savers of labor, but they have also effected many hitherto impossible divisions of labor. In many trades common mechanics, with improved appliances and tools, can now produce work beyond the best skill of the master mechanics of the past generation, but these tools and appliances are costly, and they must be taken care of by men who are specially skilled in this branch of business. Were every mechanic now required to mend and keep in order the tools he uses, he would have little time for anything else. Even when required to keep a kit of simple hand tools in good condition, he loses much valuable time, and rarely does this part of his work well. To keep even a common tool in first-class order requires the skill of a first-class man, who not only knows all about steel, its temper, quality, etc., but is practically acquainted with the work which it is expected to perform.

From such opportunities of observation and experience as we have had, we conclude that it is always economical in shops where twenty men or upward are at work, to keep one man, or several men if necessary, whose business it is to look after the tools. This part of the work includes the shaping of special tools, sharpening, repairing, and the general custody of such as are not in constant use. In small shops, where man's whole time could not be advantageously employed in the tool department, equally good results are secured by giving the most competent man charge of the tools as part of his work. In most shops where this system is not adopted, putting tools in order is usually made the pretext for a great deal of "loafing" about the blacksmith shop and the grindstones. The writer was once connected with a large machine building establishment in this city, in which about 1200 men were employed. In this shop there was, practically, no system with regard to tools. When a man or boy wanted a recess he would gather up a handful of chisels and trot off to the blacksmith shop. While they were being sharpened, and often a good deal longer, he would walk about with his hands in his pockets, an interested spectator of what others were doing. Presently he would go after his chisels, but not return to work. They must be ground. At the stones there was usually half a dozen or more men waiting their turn, and, as none of them were in a hurry, a man with two or three chisels could usually employ half or three-quarters of an hour in pleasant and profitable conversation. New tools could be had for the asking, and nobody thought of using a file after the first sharp edge was gone, or of using any other tool longer than suited his convenience. The consequence was that every shop was littered up with half worn tools, which nobody would claim. Obviously, such a slip-shod method as this is wholly wrong. The proper system gives the men who keep the tools in order charge of their distribution and return. They should have rooms to themselves, with windows opening into the shops with which they are connected. When a tool needs attention, they receive, sharpen or repair, and return it to the workman by a boy. In the meantime, the workman having the dull or damaged tool receives a duplicate to work with, which

he gives up when his own tool is returned to him, or keeps in exchange, according to circumstances. All new tools which he receives are charged to him, and a corresponding credit is given when he returns them. Tools which are used only occasionally, such as jack screws, large wrenches, heavy hammers, and a great many other implements of which there is only one set for a shop, should always be charged to the man who receives them or the foreman in charge of the work on which they are used, and it should be the invariable rule that all such tools must be returned to the office. The advantages of this system are a saving in time, a saving in tools and the inculcation of habits of order and careful handling of tools. Where it is neglected, loss of time, an unnecessary wear and tear of tools, and the formation of careless and slovenly habits, are inevitable.

Bronze, Pewter and Tin.

Tin plate forms the principal material for the manufacture of the culinary utensils of all civilized countries. The tin cup, pan and pal are found in every house, from one end of the land to the other. Without tin vessels it would seem that the work of the housekeeper would, for the moment, be brought to a standstill. It will be both profitable and interesting to glance at the steps by which civilization has reached this abundant use of the so-called tin plate.

In the early ages of the world, the metal vessels for cooking were of copper or brass, many of them not unlike in shape those in use at the present day. Although iron was known to the ancients, it was a metal altogether too valuable to be used for such purposes; moreover, it was too difficult of manipulation. In Egypt, Greece and Rome alloys of copper were, as in more ancient days, used for the metal utensils of the kitchen. They were easily worked, and, above all, cheap, and when taken care of, were brilliant, a consideration by no means without its weight in those times. In the extreme East, bronze, brass and copper have been from time immemorial used for the manufacture of cooking vessels. The bronze was earlier used than the brass—tin and copper being known long before zinc was considered a useful metal. It is said that the first brass made was produced directly from the ore, the zinc and copper ores occurring in combination. Pliny speaks of making brass by a sort of cementsation process. Much of the early work in brass, copper and bronze was cast, even when the metal was to be quite thin. Copper was, from the first, worked out under the hammer, on account of its great malleability. Beaten and cast work were also to be found combined in the same article. During the later times iron somewhat disputed the field with bronze and brass, but it was more difficult to work, and could not be ornamented with anything like the ease of brass or copper. In the early and middle ages the people were in little better condition than serfs, and what they used for cooking was of no account. The pot in which food was cooked served for dish and plate, while fingers answered for forks, knives and spoons. Lead had been known from early times, and was largely used for roofing, plumbing, and in various ways in the houses of the rich and in great buildings, and being much cheaper than bronze, was the first metal that was adopted for making kitchen ware for the common people, when they began to be sufficiently civilized to need such things. Taverns and public houses took the cheaper metal, and gradually there arose a demand for something less costly than the bronze. Lead, however, was too soft, and an alloy of tin and lead, or of tin and some of the harder metals, was found suitable for the manufacture of drinking vessels, platters and dishes generally. It was cheap, easily worked and abundant. When polished it was brilliant, and could be readily ornamented. It bore about the same relation to bronze that silver does to gold, and hence was just the metal for the time. As early as 1482 the pewterers were incorporated as the sixteenth company of the city of London. The general introduction of pewter as a metal for the common people may be said to characterize one of the great steps of the world's progress. Without this soft and tolerably strong metal the people would have been without dishes, except those of unglazed pottery. Cups, tankards, bowls, goblets, drinking cups, platters, mugs, inkstands, measures, teapots, and a thousand other articles of common use were made from pewter. Stone china was unknown, porcelain was for princes, and earthenware was so rough and poor as to be fit only for the commonest sorts of utensils. Pewter held its position until a comparatively recent date. The improvement in stone china and porcelain contracted its field of utility on one side, while the introduction of cheap and good cast iron ware, the general improvement of sheet

iron goods and, the introduction of silver plate, took away what remained. Then tin plate came into use and became the material of greatest utility. Pewter is not wholly driven out of use, for there is an extensive trade in it, and the manufacture of pewter and Britannia metal is an immense industry in England, but the use of articles made from these alloys is by no means general. Tin plate seems to answer in almost every respect the requirements of what may be called a popular metal. Light, strong, cheap, easily worked, and giving off no poisonous combinations, it supplies more wants than could be readily enumerated. Its faults are too rapid decay by the rusting of the iron or the dissolving of the tin by vegetable acids or by alkalies. The progress which has been made in the working of tin plate within the last twenty years is remarkable, and all the more so because unnoticed. In every tin shop in the land an observer with a good memory can find evidences of progress. The cheapest tin pal now sold is a better article than could have been bought for money twenty years ago. Trimmings which then each man made for himself, are now stamped out by power. Forms are improved, and in goods made at factories there was nothing in the old times to compare with them. They belong to an entirely new class, and in stamped, spun and planished ware made from tin plate it would seem as if there remained but little room for improvement. We have not, however, learned all that is to be known of the adaptability of tinned iron to common and special uses, and perfect as our products now seem, the progress of improvement is rapid and sustained. The place of tin and tinned iron in the economy of civilization seems to be a permanent one, and no metal which we now have in sufficient quantity has the qualities which must be possessed by the metal which shall supersede, or even actively compete with, tin and tin plate.

Position of the Tin Plate Markets.

Since the beginning of the current year there have been but moderate dealings in tin plates from importers' hands, speculators having wisely concluded to let them alone for the present. There has been a tolerably steady demand from consumers—sufficient to reduce the stocks in this market considerably below the averages of former years, and even this moderate stock is pretty much concentrated in one hand. From the interior we hear that only light stocks are held, which is quite probable, as the jobbers of Chicago and other Western markets have bought only about one-quarter of their usual requirements. In a less degree, this is also true of the Eastern and Middle States.

There seems no probability of an immediate change in the conditions affecting this branch of the metal trade. The market for tin plates is dull, but by no means stagnant. Notwithstanding our increased imports from England, the consumptive demand has been sufficiently active to prevent any accumulations in importers' hands, and this fact shows a more general activity in the trades using tin plates than was commonly supposed. For plates suitable for the manufacture of household utensils, the demand has been less this season than in former years; also for roofing plates. For other kinds and qualities the demand is just now unusually large. The manufacture of cans for fruits, vegetables and meats consumes immense quantities, and the requirements of the lard, petroleum and paint trades are steadily increasing.

The following shows the export of British tin plates during the six months ended with June last:

	1873.	1874.	1873.
To the United States	4,329	40,771	49,645
To other countries	19,807	13,817	17,196
	2,129	63,534	66,843

of which in June there were sent to the

	1873.	1874.	1873.
United States	9,636	8,769	8,108
Other countries	4,175	1,819	2,693
	13,780	10,588	7,801

The following has been England's export boxes for three years ended with 1874:

	1874.	1873.	1872.
To	Boxes.	Boxes.	Boxes.
United States	1,563,994	1,511,632	1,531,356
Holland, Germany and New Zealand	96,313	63,647	83,902
Italy & Mediterranean	42,394	76,890	82,565
Canada	73,900	114,639	76,096
France and Switzerland	66,188	69,318	72,526
South America & Brazil	40,318	71,589	59,973
Spain and Portugal	51,079	50,682	50,983
Navy, Sweden and Baltic	64,041	48,810	48,810
India and China	44,696	42,515	44,506
West Indies	5,953	8,454	6,292
Cape, Ceylon and Mauritius	3,111	7,964	5,933
Africa	4,169	3,038	2,988
Other countries	1,755	1,192	286

2,143,468 2,153,477 2,083,451

The foregoing shows that the general decrease last year over 1873 was about 10,000 boxes, but that our increase was about 75,000 boxes. This year's movement exhibits an increase thus far of 2606 tons to the United States.

In spite of the steady augmentation of

export from England, prices there have experienced a severe decline, as will appear from the following comparison:

July 1, 1875.

Report upon the Eames System of Furnace Working with Petroleum.

BY PROFESSOR HENRY WURTZ.

Having been called on to examine and report upon the novelty, the principles, and the value of the system of Dr. C. J. Eames of obtaining from crude petroleum simultaneously both the heat and the power needed for metallurgical operations upon iron, I have made several visits to his furnace, as operating in Jersey City, and examined critically the work there carried on, of piling and reheating waste scrap iron, and rolling it into boiler plate; and have now the honor to report my observations and conclusions. In so doing, it is proper to say that this present report is not intended to cover all the scientific questions that arise out of the new system of firing furnaces and making steam with petroleum, some of which remain yet to be fully worked out; but that I propose to restrict myself mainly to those points which are of immediate import to practical men.

NOVELTY OF THE METHOD AND APPARATUS.

The cuts, Figs. 1 and 2, represent an ordinary reheating furnace for iron, such as the experiments were made with in Jersey City; the form being by no means the best for developing the full merits of the new system, but answering tolerably well for the experiments made. Figure 1 is an external and Fig. 2 a sectional view. In Fig. 2, letters A B D indicate the Eames vapor generator, called simply the "generator," the main feature of the new apparatus and process. A is a cast iron vessel, with horizontal shelves projecting alternately from opposite sides, over which shelves the oil, entering at D, at the average rate—for this one furnace, when heating 3000 lbs. of iron at a charge, and making steam for the rolls beside—of 30 gallons or 200 lbs., as a maximum per hour, flows downward in a thin layer, dripping from shelf to shelf. It thus meets a slow opposing current of steam heated to incandescence, and kept at a pressure of about 10 lbs. per inch, and which passes upward from the super-heating coil B, enclosing the fire. Every trace of oil is taken up, and swept on to a mixing chamber which occupies the former fire space, where it meets the air blast entering at the point E (the former ash pit). It will be observed that the former "bridge-wall" of the furnace is built up solid to the crown, except the space H G, called the "combustion chamber," an important and essential part of the Eames inventions. This consists simply of a cellular tier of fire bricks placed on end, extending all across over the old bridge wall. Within these cells the combustion begins, and it is found that if this combustion space has a horizontal thickness of more than 18 inches, the fire bricks fuse down. It is intended to represent one of the piles of scrap iron, with its top and bottom "covers," of which, however, six, averaging 500 lbs. each, are introduced at a charge, in regular working. The course of the flame under, and back through, one of the flues of the boiler above and thence into the stack, is sufficiently indicated by the arrows. This apparatus is covered by a series of patents, that for the generator being No. 132,266, of date Oct. 15, 1872.

CHEMICAL PROPERTIES OF PETROLEUM.

A slight discussion of the chemical and physical nature and properties of our American petroleum will be a highly useful introduction to a practical discussion of this new process of utilizing it. Crude Pennsylvania petroleum is a mixture of a large number of compounds of carbon and hydrogen, of densities, boiling points, etc., varying among each other throughout a very wide range. According to one of our first authorities in the study of petroleum, Dr. Vander Weyde, these different compounds, when once separated from each other, boil at temperatures ranging from that of ice up to 700° Fahr., or higher. Its average density is about 45° Beaume, corresponding to a gravity of 800, water being 1000. Thus 1 U. S. gallon of water weighing 8.332 lbs. avoirdupois, 1 gallon of average crude petroleum weighs 6.67 lbs. Its composition is about as follows:

Carbon.....	84
Hydrogen.....	14
Oxygen.....	2
	100

The average latent heat of the vapor of petroleum has not been very satisfactorily determined, but it is known to be very low. Dr. Ure states it at 184, that of steam being 1000, of alcohol vapor 457, and of ether vapor 313. That is, an amount of heat that will vaporize but 1 lb. of water, and about 2.2 lbs. alcohol, will vaporize 5.4 lbs. of petroleum (assuming no important change of specific heat during the change of state). By measure, the amount of heat or fuel that will vaporize 1 gallon of water should vaporize no less than 6% gallons of petroleum. This is an important practical point in this connection. The density of its vapor is very high, averaging, if the whole mass be converted into vapor, six and a half times the density of air at the same temperature. At 500° Fahr. it will all pass into vaporous form, except a trifling percentage, and at that temperature air will weigh per cubic foot

$$565 \times 42 = 298.26 \text{ grains}$$

$$500 - 60 + 492 = 532 \text{ grains}$$

(565 grains being the weight of the cubic foot of air at 60°, and 1-492 its co-efficient of dilatation for the Fahrenheit degree), then—if we admit for it the same co-efficient of dilatation as for air—petroleum vapor at 500° weighs 1939 grains per cubic foot, and one gallon of petroleum should yield only 24.08 cubic feet of vapor of that temperature.

The specific heat of liquid petroleum is stated to be 4654, that of water being 1. The specific heat of its vapor does not seem to have been determined, but it probably will not greatly differ from that of the liquid. When boiled down, a tarry residue is always left, which, on raising the heat, chars and leaves a coke-like mass behind. This becomes, also, in such cases as we have under consideration, a highly important matter.

CALORIFICS OF PETROLEUM.

The heating power of Pennsylvania petroleum has been determined with sufficient accuracy for all practical purposes. For oil from Oil Creek, H. Sainte Claire Deville, experimenting for the French government in 1869, found a total calorific power of 9963 Centigrade units, equal to an evaporation of 16.17 lbs. of steam per lb. of oil; and his actually obtained yield of steam was 14.05 lbs. per lb. of oil; 1233 heat units out of the 9963, by exact measurement, being lost in operating the chimney to produce draught, and 76 units by radiation—in all, 1328, or 13.63 per cent. of the whole.

Another Pennsylvania oil, from Franklin, on French Creek of higher density (*Huile lourde*), gave him 10,672 units in all, and Ohio oil, dense and black, gave 10,390. The first sample, from Oil Creek, doubtless represents about the average of the crude oil of commerce, and is hence adopted by me as a basis for calculation. As the total heat of complete combustion of carbon as charcoal—according to the mean of the figures of Andrews and of Favre and Silbermann—is 7900 units per lb.; Pennsylvania oil, therefore, may be practically rated as having just 25 per cent. more heat in it per lb.

* See the Proceedings of the American Association for the Advancement of Science for 1858, page 176; also Silliman's Journal (*Am. Jour. of Science*), vol. xxvii, page 24.

than (chemically pure and perfectly anhydrous) wood charcoal; or (supposing ash and condensed gases present equivalent to ten per cent. loss) 40 per cent. more than common charcoal. The theoretical powers of the best British coals per lb. are estimated to be between 14 and 15 lbs. of steam; but the British Admiralty, in a long extended and elaborate series of experiments, found that the best actual result from the best steam coals was 9.5 lbs. of steam per lb.; and not more than eight pounds with ordinary coals. Experiments, by what was called the Dorset system, of making steam with heavy oils from boghead mineral, were made at Woolwich in 1866-7, during 18 months. Steam jets (not super-heated) were here used to convey these; 15 lbs. of steam were made on an average per lb. of oil. The account shows great general imperfection of operation and of combustion, with large production of soot and smoke; but the maximum result, when the combustion, as we may believe, was exceptionally perfect, was 17.8 lbs. of steam per lb. of oil, which was even above the full theoretical value of the oil! With perfect combustion and skilled handling, we may safely adopt, as the actual steam value of our petroleum, fifteen lbs. of water made into steam by one pound of oil—equal to just 100 lbs. of water per gallon; 4400 lbs. per barrel, or 528 gallons of water vaporized by one barrel of oil, from 212° Fahrenheit. The maximum of 17.8 lbs. of the Woolwich experiments above, may be, in part, explained by a somewhat greater inherent calorific capacity of the bog-head oil over petroleum [Capt. J. H. Selwyn, who reported the Woolwich results, pointed out, as inexplicable, that this figure went clear beyond the total absolute calorific capacity of the material, estimated by the usual rules. I call attention to this, to introduce the true ex-

'Breckinridge coal,' could be bought in New York. On procuring some of these and using them with the blowpipe I found that their flame was much hotter than that of the wax candle."

It will be scarcely necessary to add that I connect the intensity and concentration of the heat of the oil flame with the great density of the oil vapor, that I have above pointed out, and that I liken the flame of the Eames furnace, with unquestionable accuracy, to that of a blowpipe. In the case of coal fires, including those with the so-called "gas generators," as doubtless all will readily comprehend, the flame which is directed upon the hearth is essentially a flame of carbonic oxide gas, a gas whose density is just that of atmospheric air. Moreover, this carbonic oxide is already diluted with the nitrogen (equal to twice its own volume) of the air that has served to burn the carbon to carbonic oxide; so that, compared with the oil vapor, far less combustible matter is contained in the same space, and if the oil vapor were pure carbon vapor, the difference in temperature might be very great. Much hydrogen, however, is present, to form water in its combustion, which takes up heat, as latent heat of steam; and to compare the theoretical temperatures of the flames requires quite complex calculations, that cannot be here entered into. If exactly the right amount of air for complete combustion could be introduced in the two cases, there would really be a small difference in the final resultant temperature of the fully expanded products of combustion in favor of the carbonic oxide (that is, comparing, I mean, a pound of carbonic oxide with a pound of oil). A vast difference is, nevertheless, actually found in practice, as in the experiments above with the blow-pipe on paraffine

obstruction of the tubes by deposition of solid carbon:

"Isherwood states the advantages of the use of mineral oils, in his experiments, as follows:

"1. A reduction of the weight of fuel, amounting to 40.5 per cent.

"2. A reduction in bulk of 36.5 per cent.

"3. A reduction in the number of stokers in the proportion of four to one.

"4. Prompt kindling of fires, and, consequently, the early attainment of the maximum temperature of furnaces.

"5. The fire can, at any moment, be instantaneously extinguished.

"Other advantages, not here mentioned by Isherwood, are the uniformity of combustion and of heating attainable, and the absence of ash."

Further on, under "Gaseous Fuel," Prof. Thurston remarks:

"The advantages possessed by gaseous fuel are:

"1. Convenience of management of temperature.

"2. Freedom from liability to injure materials with which the products of combustion may come in contact.

"3. The facility with which thorough combustion may be secured.

"4. The readiness with which the flame may be given either an oxidizing or a deoxidizing character."

In another place he says:

"The maximum temperature attainable in furnaces burning gaseous or vaporous fuels, when properly proportioned, is usually only limited practically by the heat resisting power of the furnace walls."

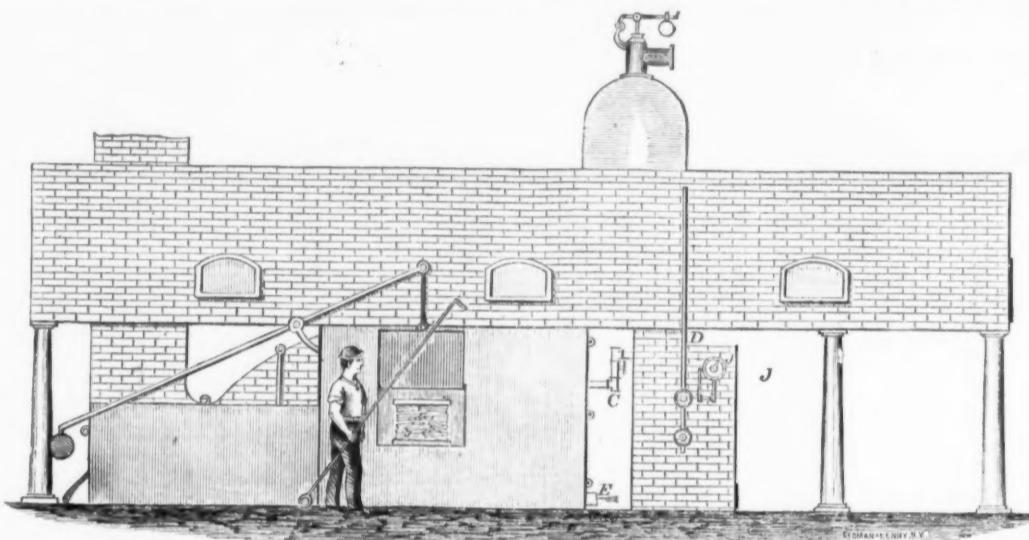


Fig. 1.

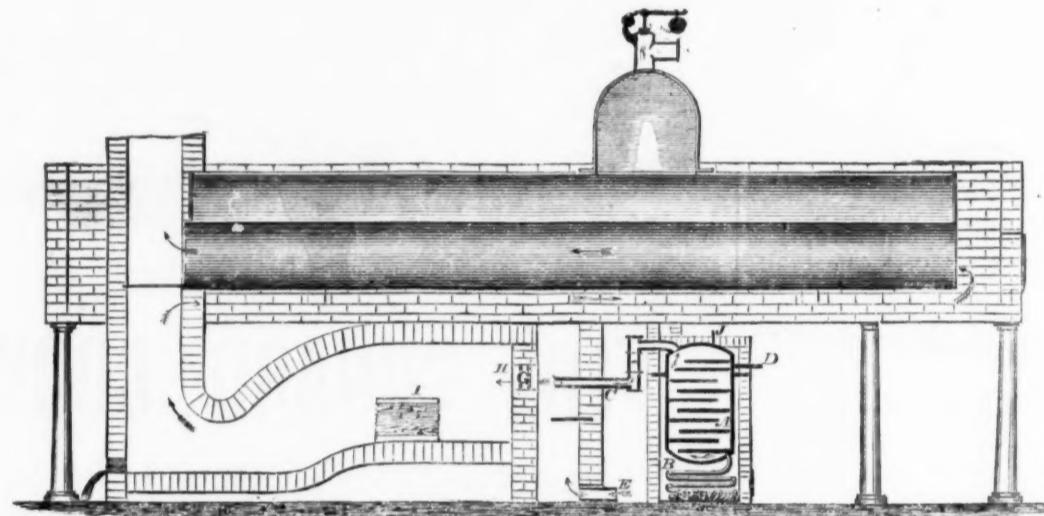


Fig. 2.—FURNACE FOR THE EAMES PETROLEUM IRON PROCESS.

Explanation of this fact, which, so far as I can learn, has never been given before. Carbon, like everything else, has a latent heat of fusion or of liquidity, though the amount of this is yet unknown. It seems probable that it is large in amount. In case of oil fuel, we are clearly dealing with liquid fuel or fused carbon, which, according to this view, would yield us more effective heat for equal weights than solid carbon in coal. This has been overlooked in the accepted modes of estimating the calorific effectiveness of liquid fuels, and they must have been underestimated accordingly.]

We must not rest satisfied, however, in the case we have in hand, with a valuation of the steam making power only of our oil fuel. In metallurgical work—certainly in Siderurgy—other considerations enter, of which it is very important we should gain a clear idea and appreciation. Above all things we need, in these cases, concentrated heat. This, indeed, has been the undoubted reason why many intelligent practical iron men have looked askant, and with no inexcusable incredulity, upon the use of oil in Siderurgy. Their very natural supposition has been that for producing concentrated heat solid fuel was most suitable. Hence, I would here enter upon some slight considerations belonging to the chemistry of flame. Seventeen years ago, at a meeting in Baltimore of the American Association, in 1858, I presented a view, then so novel and having so little obvious practical bearing, that it has obtained no attention, but which now comes up with such direct and weighty practical application, that I shall be excused for reproducing the passage.* The subject under investigation was the Flame of the Blowpipe. The passage is as follows:

"An ordinary alcohol flame gives, with the blowpipe, a comparatively feeble heat. A gas flame is much superior, and a large wax candle gives probably a higher heat than anything else in common use. It occurred to me that the heating effect was dependent on the density of the burning vapor, or the quantity of combustible matter contained in the same volume. I therefore sought for combustibles having a higher density of vapor, and found that the paraffine of Reichenbach, now known from the investigations of Hofstaedter and Filippuzzi to be a mixture of different hydrocarbons, was found by Lewy to have a vapor density of not less than 11.8. By inquiry I found that candles composed of this or similar material, obtained from the products of the distillation of the

vapor. This is abundantly proved in the oil furnace, by the far shorter time required to heat up the hearth. When all things are fairly considered, and the facts recognized that are to be set forth below, resulting from the actual working of the oil-furnace, it will come to be admitted as entirely within bounds, to rate the practical siderurgical value of oil fuel, when smokelessly burned, with the essential aid of the incandescent steam-jet through the generator of the Eames System, at from seven to eight times its weight of the best coals (the latter being burned without a regenerator). As the average market cost* of the oil ranges, weight for weight, even at this distance from the oil centers, at less than three times that of coal, this rate of valuation proves it, as fuel for furnace work, to be greatly cheaper than coal, in addition to the other advantages from its employment. This result is unexpected and astonishing, but altogether impossible of denial.

SCIENTIFIC OPINIONS REGARDING OIL FUEL.

Through the favor of Professor Thurston, of the Stevens Institute of Technology, I am permitted to quote some sentences from an unpublished MSS. work of his—embodying his lectures at that Institution, as well as at the U. S. Naval Academy, for a number of years past, which have here an interesting applicability. These will serve to demonstrate that gentlemen like the one quoted, who combine practical skill and training with scientific attainments of the first rank, have been fully prepared to accept and to welcome such development as this one of Dr. Eames. Professor Thurston says, on the head Liquid Fuels: "The liquids best adapted for use as fuel are the mineral oils. They yield an immense heat, the products of combustion, as well as the fuels themselves, are comparatively free from deleterious elements; and the temperatures obtained by their use are easily regulated, when they are burned in manageable quantities."

"Capt. Selwyn, R. N., reported an average evaporative power from 212° F. of 16.77 lbs. of water from 1 lb. of a liquid fuel, which had a theoretical efficiency of 17.52 lbs. In another instance, he gives an evaporation of 14.98 lbs. of water, from 212°, by a fuel having a theoretical evaporative power of 17.5. *

* Experiments made by Engineer-in-Chief Isherwood, U. S. N., under the direction of the U. S. Navy Department, upon various systems of utilization of petroleum as fuel, gave a maximum economy, over the use of anthracite, of 68 per cent., by Fisher's method of burning oil; and of 38 per cent. by Foote's process of using liquid and solid fuel together; and he reports the failure of another method, by reason of the

SOME FURTHER CHEMICAL POINTS.

In the 24.08 cubic feet of vapor, shown to be deduced from a gallon of petroleum, there are, deducting the hydrogen corresponding to the two per cent. of oxygen, 5.66 lbs. carbon which require 14.041 lbs. oxygen, and 0.92 lbs. hydrogen, which requires 7.336 lbs. oxygen for complete combustion to carbonic acid and water; in all 22.277 lbs. oxygen, equivalent to 12.68 cubic feet of air. Each cubic foot of the petroleum vapor at 500° requires, therefore, for complete and smokeless combustion, not less than 52.6 cubic feet of air at 60°, which latter must moreover be mingled with it perfectly and uniformly. Below this proportion it is certain that a flame may result more or less fuliginous. Hence we learn two things—the necessity of an enormous supply of air to this furnace, and that this air must be injected with rapidity, and caused to move in currents as sinuous as practicable, to promote rapid and complete mixture with the combustible vapors. Thirty gallons of oil per hour may be stated as a practical consumption for one of these reheating furnaces, with a charge of 3000 lbs. iron. This requires, for complete combustion, a minimum blast of 38,040 cubic feet of air per hour, or 10.5 per second. As some excess of air, however, is always necessary, we may properly put the minimum at 12 cubic feet per second.

In the cases, hitherto, of experiments for steam making with oil fuel, the most frequent, indeed, I believe, universal trouble—the veritable *bete noire*—has been soot and smoke; things which, in the Eames system, appear to become so manageable, that in all my visits I have not yet witnessed a visible exhalation of smoke from the stack of the furnace. It is doubtless due to this cleanliness and purity of the flame that so large a proportion of the heat is abstracted from the products of combustion by the boiler, that when 30 gallons of oil per hour were burning in the furnace, and the temperature on the hearth ranged at 300° Fahrenheit and upward, a Tagelabius pyrometer, inserted in the flue immediately above the boiler, ranged only from 320° to 350° Fahrenheit, averaging 335°. With ordinary fuel, 600° to 700° is not an unusual temperature for such chimney gases.*

THE TEMPERATURES OF THE PETROLEUM FURNACE AND STACK.

The temperature of the fire-space or, hearth, of the oil furnace was determined by the familiar method of Pouillet, by heating therein a weighed block of iron and then plunging the same into a weighed quantity of water of known temperature. The weights of iron and water, the initial and final temperatures of the water, and the known (very different) capacities for heat (or specific heats) of water and iron, as 1000-1124 furnish the data for very simple calculation of the temperature of the flame. The first experiment, with all proceeding in fair order (though the furnace was not considered to be doing its best), the iron weighing 5.237 lbs. and the water 20 lbs., the initial and final temperatures being 75° and 174° F., calculates to 322.1° F. Before the second one was obtained, the furnace—an old one and out of repair from the outset of all these experiments—was giving out; a considerable part of the crown having fallen in. The second weights were 7.51 lbs. iron and 25 lbs. water, and the temperatures 75° 25° and 184°. This calculates to 323.2° F. The errors (loss of heat, etc.), were all against the furnace, and all the experts present agreed in the conclusion that a heat of 3500° F. could undoubtedly be obtained with this flame in a properly constructed furnace in good working order. To give an idea of this temperature, it may be stated that the greatest heat obtainable in the iron blast furnace, according to Bucqueler, is 3300° F. Cast iron (same authority) melts at 2780° F.; steel, somewhere above 3000°; but authorities differ largely on this latter point, which must be considered as still unsettled.

The temperature of the chimney gases, after passing the boiler, was on this day lower than usual, ranging from 320° to 330° F., indicating, doubtless, a lower initial temperature of the fire space than previously, due to the increasingly bad condition of the furnace. The temperature of the air having been 80°, the proportion of the total heat produced, that was being utilized and saved in this furnace, is easily calculated. Taking 3300° as the maximum heat, and 325° as that of the chimney, this proportion is equal, by an obvious formula, to:

$$\frac{3300 - 325}{3300 - 80} = 0.239$$

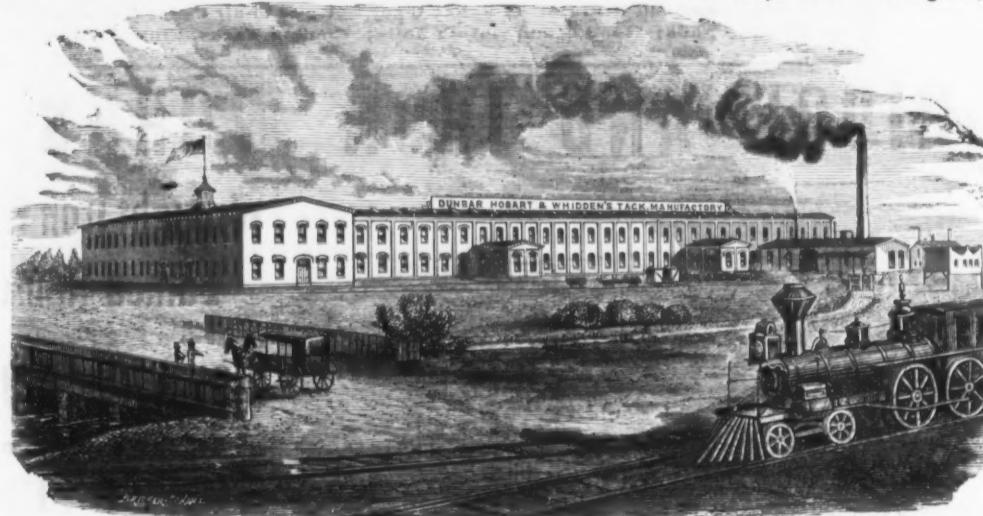
or 92.39 per cent. of the total heat, as the saving in this operation. This is a very large proportion. If we now, in round numbers, allow 10,000 centigrade units as the total calorific capacity of the oil, from Deville's actual determination, = 18,000 Fahrneheit units; we can easily calculate how much steam should be made by this furnace, when carrying also its full load of iron; that is, if we make one arbitrary allowance of 5 per cent. loss for one small unknown factor, namely, the sum of the latent heat of fusion and specific heat of the slag. In this case we have no allowances to make, as with coal, for imperfect combustion and specific heat of ashes and cinders. 200 lbs. of oil per hour = a total heat of 3,600,000 F. units; 92.39 minus 5 per cent. for the slag, or 87.39 per cent. of this = 3,146,040 units. The specific heat of iron being taken at 112°, to heat the 3000 lbs. of iron to

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The Southern States Coal and Iron Company.

From a prospectus issued by the Southern States Coal and Iron Company of Stockton-upon-Tees, England, we learn of another scheme for the investment of English capital in American mining lands. The purchases already made on behalf of this company consist of some 50,000 acres of coal lands on the Cumberland mountains; also about 100,000 acres of iron lands, in different sections of Tennessee, comprising a full assortment of all the different families of ores, thereby insuring the very best quality of iron. All of their properties are contiguous to each other, both by rail and river, and especially to their property site, where they intend erecting their factories, which from the map which accompanies the prospectus, appears to be on the Tennessee River, a few miles above Bridgeport. Their prospectus gives a full analysis of all their ores; also their coal and coke. By actual comparison their coal and coke is equal to the best Pennsylvania coke and coal, while their ores, taking into consideration the fact of the great assortment that exists, far exceeds any locality in the United States. The quality of their coal lands, of which we can particularly speak, we think cannot be excelled anywhere. They consist of a little over 50,000 acres, and have an aggregate thickness of over thirty feet of coal. The lands are very fair for farming, while for raising fruits of all kinds they are not excelled anywhere. The lands are mostly covered with chestnut oak, from which is taken the bark which is used in making the tannin extract, which has of late years become an article of considerable export. From this one article alone may be derived an income worth much more than they pay for the land. The men who compose the company are among the wealthiest of England, including such men as Daniel Adamson, James Bowron, F. A. Babcock, Henry Barrett, William Barrett and the Whitwells.

which is a chamber the full size of the stack at its largest diameter, covered with close top or left open, at the pleasure of the operator. This space is calculated as a combustion chamber for the gases arising from the charges, in which the hot blast pipes can be placed, forming essentially the hot blast oven.

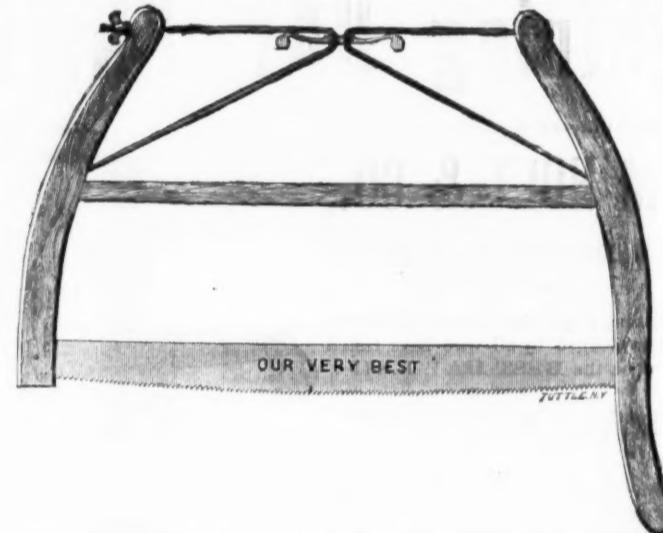
The doctor proposes that he can introduce at any one of his bridges any amount of oxygen which may be desired; that he can also thoroughly carbonize his charge, as it is passing down, in such manner as to make any grade of metal which may be required for iron or steel purposes, and thus dispense with all subsequent manipulation to obtain graded metals. He also attaches a reheating furnace to the bottom of the smelting furnace in such a manner as to take the molten or reduced metal directly from the smelting furnace, by its gravity as it comes down, and manipulate it into balls ready for the rolls.

The scheme is quite an elaborate one, but whether it is fully practical can only be told by trial. We fancy that the large amount of wall surface would be an objection on account of the liability to cut and the great trouble in making repairs; and the labor of watching the charge from the bottom up, upon six bridges, and by means of a tool assisting to bring it down, is an untried experiment. Too much or too little fuel would defeat the operation of the whole scheme, and to grade the quantity exactly right, where the mass is not compacted and is subject to easy disturbance, would be a difficult matter. Still, the scheme is worthy of investigation, and we give it to the criticism of our readers.—*Cleveland Trade Review*.

A Railroad 300 Feet Above a City.—It is difficult to imagine anything better adapted to produce a vivid and startling impression on the memory than the first sight of Morlaix, Brittany, as approached by rail. The city lies on both sides of a deep, narrow valley, and the railroad springs across the chasm on a magnificent viaduct 300 feet high. Entirely unprepared for anything of the sort, the traveler suddenly finds himself taking a bird's-eye view of a city of the middle ages. There it lies, 300 feet below, almost as if it were in the days when Mary, Queen of Scots, passed through here on her way to Holyrood and the scaffold. The precipitous, winding, narrow, darksome streets, the peaked roofs, misshapen by time and stud-

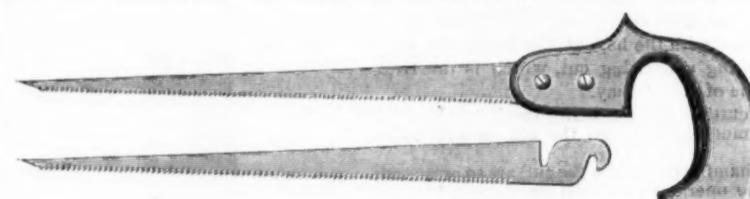
Patent Saws.

The Wheeler, Madden & Clemson Mfg. Co. have added to their assortment for the season of 1875 a new pattern Framed Wood Saw which they style "Our Very Best," and which is illustrated in the accompanying cut. This



Frame was patented February 9th, 1875, and is strained by an adjustable thumb lever connecting the braces. The saw is belled, an improvement which makes it take hold readily, and

ded with curious dormer windows, are still there as when she looked upon them centuries ago, when with brilliant pageant she and her cortage of knights and ladies swept through



supplies additional substance to that portion of the blade most subjected to wear.

We also illustrate their patent Interchangeable Compass Saws and X. L. C. R. Corn Knife, which are placed on the market this season for

Morlaix with laughter and song. Should it be a festal day or a fair, the sight is still more unique, for the square is then crowded with booths and peasants in various costumes, and is positively white with the starched caps of the



the first time, and, we are informed, are favorably received by the trade.

New Process for Making Iron.

Dr. Clark, formerly of Cleveland, late of Atlanta, Ga., has shown us a plan which he has devised for the reduction of ores, which presents some novel features, and which he claims will reduce ores effectually and economically. He builds up a stack consisting of a series of arches, one above another, each formed narrow at the bottom, or exit, and large at the top, with a bridge built transversely across its largest area. The top of this bridge forms a table which receives the charges of ore and fuel, which, as it is affected by a reverberatory flame which passes up the stack in the front and rear of the bridge, runs over the sides and falls from one to another of these bridges until the hearth is reached. Both at the front and rear of the stack openings are left in it on a line with the top of the bridges, one for tuyere irons and the other for the introduction of a puddle bar, whereby the downward movement of the charge is not only facilitated, but the iron or other metal is more thoroughly pressed from the scours.

The charge is introduced through a shute in the front of the stack near the top, above

women. The city is divided by the river of Morlaix, an estuary up which ships come into the heart of the town. The banks of the river are faced with granite, and afford a fine promenade on each side. A smaller stream dashes roaring down the streets, bringing to the dirty lanes of the crowded town the music of the pure fountains whence it came. At Morlaix one finds himself literally in the land of wooden shoes. Almost without exception they are worn by all of various forms and sizes, colored or uncolored, to suit the whims or purse of the wearer, but always the sabot.

The steamer City of Richmond, on the last trip to New York from Liverpool, made what is claimed to be the quickest time on record between the quarantine stations on either side of the Atlantic. The vessel left Queenstown at 4:30 p. m. on Friday, July 16, and reported off Sandy Hook at 11:30 a. m. Saturday, July 24, making the total distance in 7 days, 19 hours. At 1 p. m. Saturday the officers reported at quarantine. The daily distance made was as follows: First day (19½ hours), 290 miles; the following days, 362, 360, 380, 366, 363, 361, 361, making an average daily run of 365 miles. The Adriatic is said to have made the trip in less time to a point off Sandy Hook, but owing to a dense fog near the Hook the steamer did not report for some time afterward.



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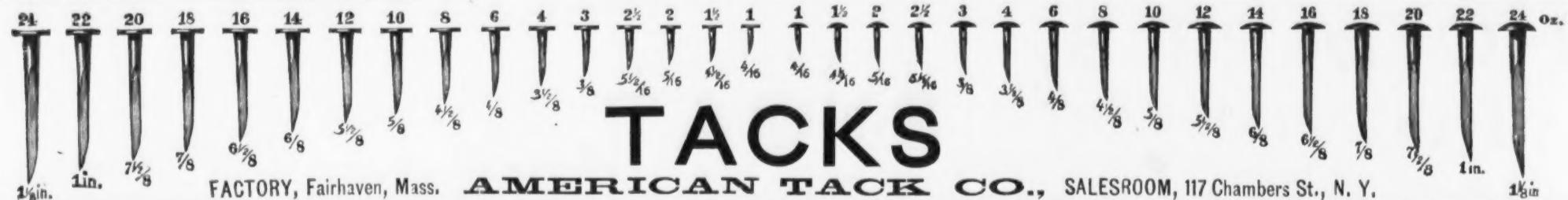
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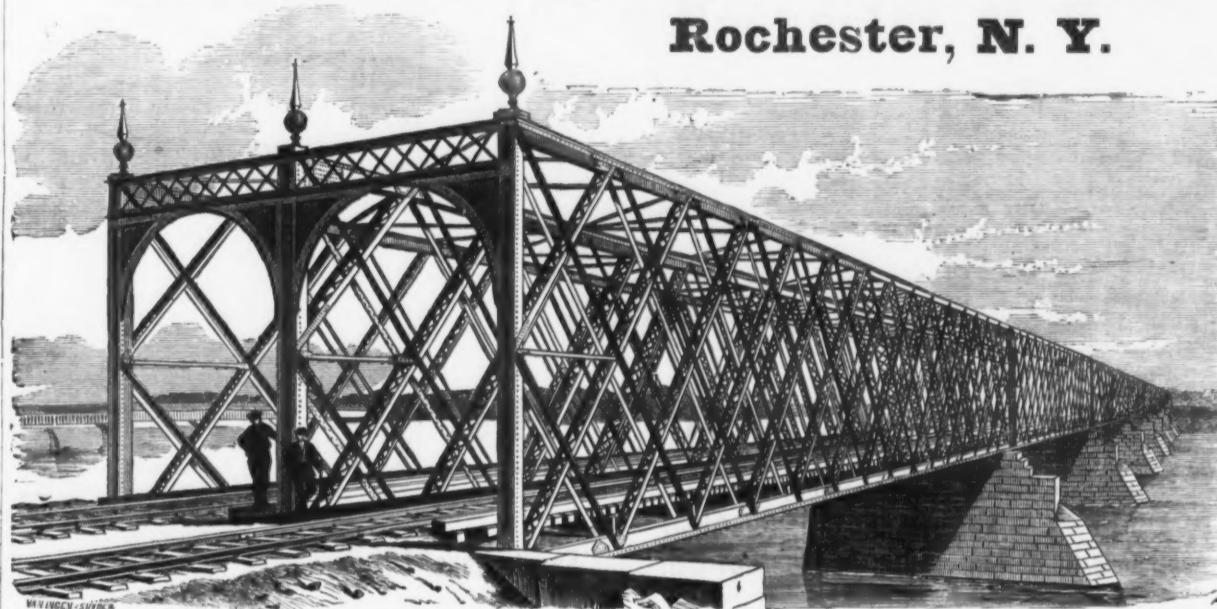
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[Accompanying engraving represents the Springfield Bridge, built by the Leighton Bridge and Iron Works.]



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The Lightning Hay Knife is a perfect success, and is acknowledged by all who have tested its merits to be the **BEST HAY KNIFE** in use.

It combines the qualities of cutting **EASY, FAST AND WELL** and is a labor saving instrument.

The blade of this knife is **SOLID CAST STEEL** of such strength and temper as the tests require. It has the **SPEAR POINT**, which enables it to enter the substance to be cut easily and in any direction desired.

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The cutting surface being small it is kept in order much easier than the old smooth edge knife.

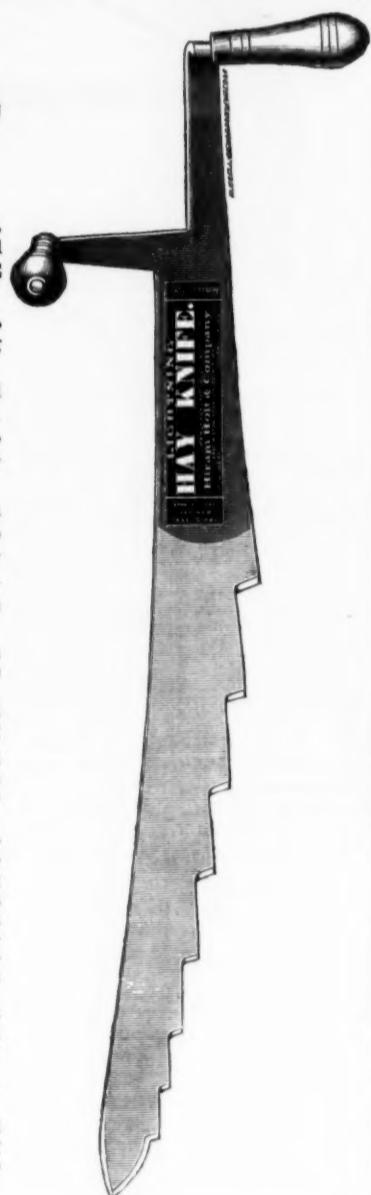
The handles (as seen in the cut) are so arranged that the operator can stand erect, and, having the use of both hands in applying his strength directly upon the knife, can, with ease, CUT TWO FEET IN DEPTH, AND TEN FEET IN LENGTH IN STACK OR MOW, IN ONE MINUTE.

It is not only valuable as a Hay Knife for dividing stacks and mows, but is a superior instrument for cutting hay from the bale, stack or mow, and corn stalks into fine feed, thus doing the work of hay cutters much faster than any other hay cutter in use. It also stands unrivaled by any implement yet invented in cutting peat, turf and muck, and ditching in marshes and meadows.

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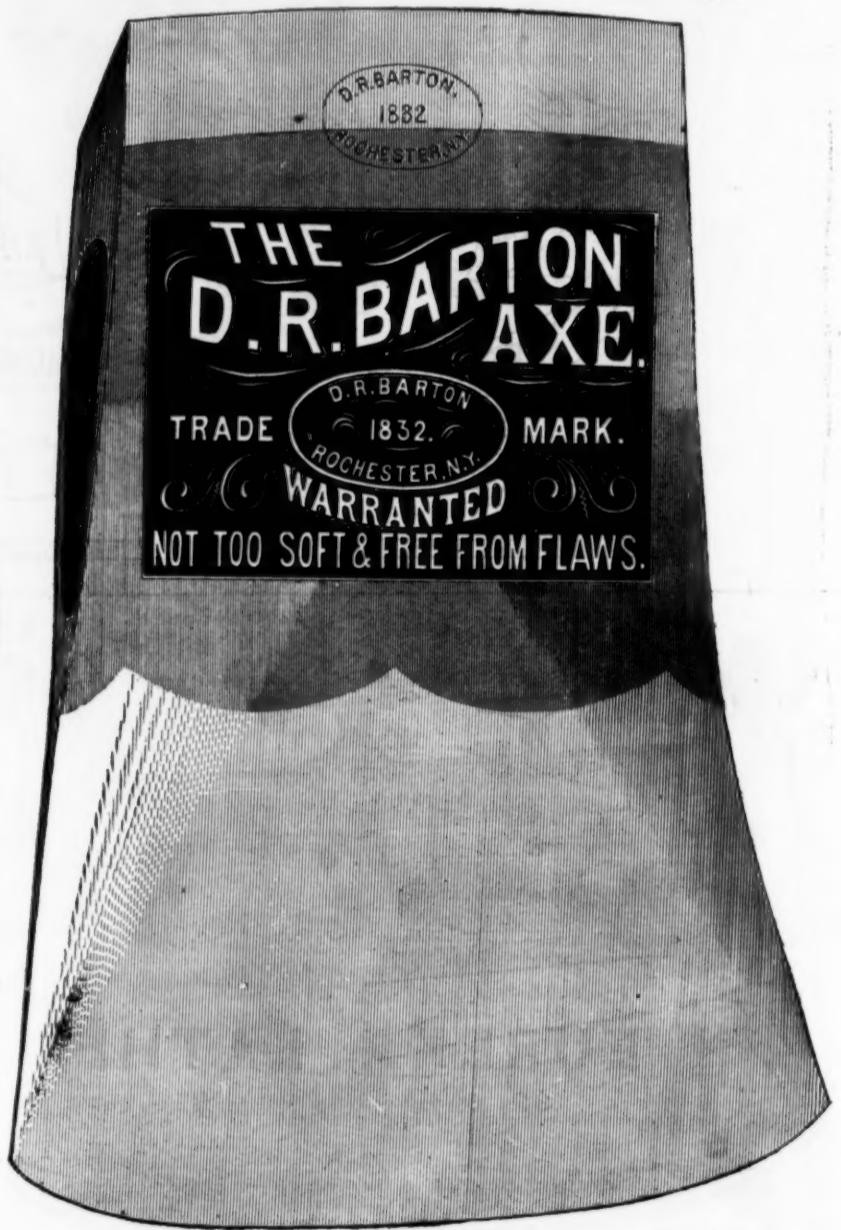
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These Wrenches are made from the best of Wrought Iron, with Steel Head and Jaw, Case-Hardened throughout, and not only combine all of the superior qualities of our cylinder or Gas Pipe Wrenches, but also all requisite Combinations of a regular Nut Wrench, thus making a Combination which has no equal. For Circulars and Price List, address,

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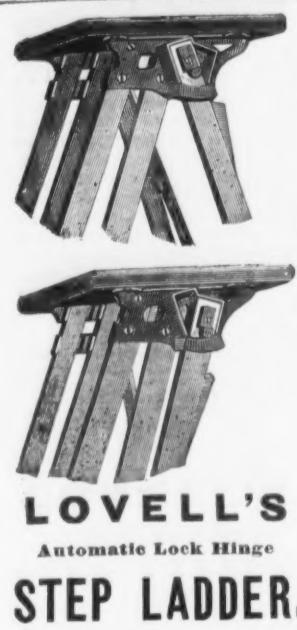
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The Best and Cheapest in
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Manufacturers of
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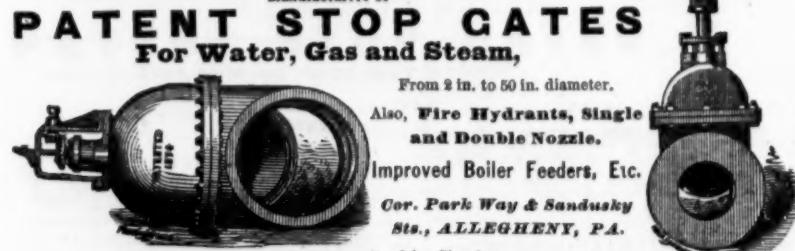
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WALNUT and ASH WAINSCOTING,

STEP LADDERS,

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Best facilities for the manufacture of Straight
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Steam Railway Approaches to the Centennial Buildings.

The Pennsylvania Railroad Company has perfected its plans for a large, substantial, and commodious depot, which will be erected within the shadow of Machinery Hall, a short distance west of the point where Belmont avenue and Elm avenue intersect each other. This depot will be 650 feet in length and 100 feet wide. The tracks in it will be laid down in the form of a circle about 1000 feet in diameter. Around this circle, within the depot, three tracks will be laid, and they will be used for all trains arriving and departing from New York, Baltimore, Washington, and innumerable other places with which the Pennsylvania Railroad has direct communication.

The trains from Jersey City and other points east and north will run direct to the Centennial grounds, reaching them by the north track in the depot, and then switch around into the yard. If three of these trains should arrive at the same time they will run from the main track and be switched once upon each of three tracks which compose the circle mentioned, and the trains will be made to stop on the Belmont avenue side, in such a manner that they will not overlap each other.

A hotel capable of accommodating about 5000 guests will be erected near this depot, and visitors from abroad will be enabled to take their seats in cars at the depots of different cities and be rapidly transported almost to its doors.

Trains which do not leave immediately after their arrival will run around the circle mentioned, and be backed upon some of the numerous sidings which it is the purpose of the Pennsylvania Railroad Company to construct on the north of the main tracks. The locomotive will be headed east, and will not leave its train, but when the time arrives for the departure of the train it will again be put upon the circle. It is intended that departing trains will invariably reach the main track from the circle, headed in the direction they are to proceed, and by this plan all danger from backing trains will be obviated.

A large number of sidings will be constructed west of Fifth street, for the purpose of carrying out empty boxes, waste material, etc., from the exhibition buildings, and it is proposed by the Centennial Commissioners to erect buildings in that vicinity for the purpose of storing the articles mentioned. The tracks that run through the Centennial grounds and buildings now will remain during the Centennial, and within the enclosure there will be over seven miles of railroad track.

Other improvements are contemplated by the Pennsylvania Railroad Company, and when the Exposition opens, its arrangements will be as perfect as they can be made.

The Reading Railroad Company has completed arrangements for the erection of a handsome frame depot a short distance from the Art Gallery. The principal object of the company is to accommodate passengers during the Centennial, but the building will be a permanent one, and after the Centennial it will serve as a general rendezvous for excursionists to Fairmount Park. This depot will be about 800 feet from the Art Gallery, and will be in a sort of triangle, formed by the Junction Railroad, Lansdowne Drive and River Road.

All the trains that run over the Reading Railroad from Pottsville and other cities and towns along the line of the road will carry all passengers to this depot who desire to visit the Centennial. The depot will be very ornamental. It will be of the French-Swiss style of architecture, and will present a rural, attractive and substantial appearance.

There will be within the depot a grand hall and large waiting room 128x48 feet in extent. A large ticket office will be erected in the center, and there will be two large wings 80x40 feet, at either end of the building. The eastern wing will be used principally for refreshment purposes, and a large restaurant will be located there, which can be approached by two entrances from the main hall. There will be a kitchen 25x30 feet. The other, or western wing, will be divided principally into ladies' and children's sitting rooms.

The entire length of this depot will be 280 feet, and the height 110 feet. A belfry and ventilator will rise from the center of the roof, and a large and conveniently constructed platform will be built, extending along the track for a distance of 560 feet and a width of 69 feet, and on this platform all passengers will be landed. A grand staircase will ascend to the main hall, and it will be 48 feet in width, rising from the platform to the height of 20 feet. Passengers will emerge from the main hall into the restaurant on the east, and a covered bridge, 48 feet wide and 30 feet long, will lead into the park, and the entire staircase will be covered.

Reading and retiring rooms will also be constructed, and the entire building will be erected in accordance with plans furnished, under the supervision of Mr. William Lorenz, chief engineer of the Reading Railroad Company.

It is also the intention of the Reading Railroad Company to construct a siding about 800 feet in length at a point about 200 feet from the Thirty-fifth street entrance to the Zoological Garden, with a small depot and platform at the end for the accommodation of visitors to the gardens.

Another railroad feature of the Centennial will be a number of peculiarly constructed and commodious cars, now being made by the Cumberland Valley Railroad Company, to run to the Centennial grounds over their own and the Pennsylvania Railroad. These passenger cars will have the seats numbered, and directly over each seat will be a receptacle provided with a lock and key, which will be used only by the passenger occupying the seat. The passenger when he purchases a ticket receives a key, to which a check is attached, and on this check

number is stamped which corresponds with the number of the seat he occupies. The passenger will use the key to unlock the closet over his seat, but it will not unlock any other closet.

When the excursionist reaches Philadelphia or the Centennial grounds, he can lock up any portion of his baggage, and thus have it kept in safety in the cars. They will be run upon a siding near the Centennial buildings, and the excursionist can depart from the train and return to it at will to unlock his closet and put in or take out food or clothing, or any other article. When the train returns the check and key are taken up by the conductor with the ticket. In these cars a Centennial excursionist who does not wish to put up at a hotel, can have what might be termed his private apartments in the car that brings him to the Centennial buildings.—*Railway World*.

Iron Matters at St. Louis and Vicinity.

A correspondent of the Chicago *Journal of Commerce* sends the following iron trade gossip from St. Louis:

In St. Louis two furnaces are in successful operation and six are idle; the furnaces in blast are making 20 per cent. on every ton of pig iron made. In the State of Missouri there are ten charcoal furnaces; three in blast and seven out, so that out of eighteen furnaces in Missouri only five are in successful operation and thirteen laid up; and yet with this status of the furnaces it is predicted that there will be a larger product of pig iron in 1875 than in 1874. I think the end of 1875 will show pig iron on hand to the amount of 1,500,000 tons.

The continued march of all industries is "forward." They make such strides that products are now almost limitless. Consumption does not now keep pace—that is limited—especially in the present times, to actual necessities; therefore it becomes the desiderata of producers to reduce the cost of manufacture to its minimum in order to produce iron at its lowest possible rates. The charcoal furnaces, if possible, should be located where the timber, the ore, the limestone and water are abundant, and, therefore, the West and South must eventually be the producers. There are many such locations in this State where iron can be produced at the furnaces with a small outlay of capital at \$16 a ton; then, with low freights to the East, the supremacy of the West to make and supply her markets will be established. Only three years ago, Messrs. A. L. Crawford, Thos. Scott and W. A. Scott, of Pennsylvania, built a railroad from Cuba, on the A. and P., to Salem, in Dent county, for the purposes of developing the iron ores of this part of Missouri and of the Simmons Iron Mountain, which they had purchased, and during last month this road shipped over 40 car loads each day, or 400 tons. The last year's experience has proved that the ores on the line of this railroad are exactly what are needed for making the iron technically known as Bessemer pig; nearly the whole product is used for conversion into steel. The Simmons Mountain is the largest deposit on this line of railroad, and shows in some places some 80 feet of solid ore. It is the red hematite mixed with blue specular, and though in some places there are faults, the prospect is very flattering for a large body of ore.

The Orchard Bank lies about a mile northeast of the Simmons, and is owned by Messrs. Lewis, Card & Co. It is a very fine deposit of the same kind of ores, known as the Meramec. This company has not only worked up to a face of over 50 feet, but also have sunk a shaft over 30 feet deep below the surface, demonstrating over 80 feet of solid ore! They are shipping over 150 tons daily. East of this bank, and adjoining it, is the Mill sap Bank, now leased by the Midland Furnace Co., of Steelville. The ore of course is the same as all the mines in this part of Missouri. It shows a very fine deposit, and will, no doubt, prove to be a valuable mine, both to the lessors and the Furnace Co. There are several other mines within a few miles of these which are not yet developed. Within a short distance of this there are several very fine furnace sites. A few miles northeast of Salem is the celebrated Benton Creek Bank, belonging to the James' estate, but leased by the Meramec I. & M. Co.; it is about a mile off the railroad, and the company have built a switch to the mines. They have been shipping over 150 tons a day, but when I was there the men were off and nothing doing—the day before having been pay day—so I left to continue my trip at some future time.

We have had so much rain that the old Mississippi looks something like a river at the present time. The water is nearly twenty-eight feet above low water mark, and the foot of the arches of our great bridge only about ten feet above the water surface, and East St. Louis is threatened with submergence, should the river rise another two feet. The large steamboats can no more go under the bridge, so that this city is at present the break of gauge, as it were, on railroads, and the transfer of all freight up river.

The Vulcan Iron Co. have begun the foundations of their steel works, and will soon begin the buildings. Business of all kinds is in the same despondent state it has been for months, but the crop reports promise a large yield of cotton and all cereals, so that the prospect for a large fall trade is very encouraging, with which promise I close for the present.

The Manada Furnace, at Swarts, Dauphin county, Pa., has been blown out, and a well-informed correspondent tells us it will be finally abandoned. This furnace, now owned by Grubbs & Bland, was built in 1836. It is a single cold-blast charcoal stack, 31x8, using water-power. Another relic of our early iron industries will be wiped out when this stack is pulled down.

A New Water Engine.

The London *Railway News* says: On Monday, May 10th, was tried at the Crystal Palace, by kind permission of the management, a remarkable water pressure engine, termed the Hercules, because it combines great power in a small compass. The Hercules, however, has the advantage of all known water engines, with scarcely any share of their faults, inasmuch that while the water is confined in a chamber, there is also no stoppage of the momentum at the end of a stroke, for the motion is rotary and continuous, and there is also but very little friction. As to the cost of maintenance of the power, it is stated, and even guaranteed, that where there is a "head" of water ranging from 50 to 500 feet in height, the loss of power from friction and all other sources is so very low as only to reach 10 to 15 per cent. Above all, the Hercules works very smoothly and noiselessly, without any shock whatever or interference with the regularity of motion. It is the one machine above all others which seems to be the fittest for use in case there should be brought about the much desired and great revolution in the use of mechanical motors, that of employing one large central power as a primary source of motion for many smaller ones. For example, suppose that in London and other large places there should be set up a great pumping engine known as the "Cornish engine," it being one of the most economical modes known of employing coals and steam, this engine would pump water to the top of a high tower, which would also serve as a chimney stack. There would be no need to have a cistern on the tower; it would be enough that at its summit the water pipe would make a bend downwards, elevation being then used only to give pressure by the height; when, from the main source of water supply thus created, pipes could be led off in various directions, as branch sources of power, to Hercules engines at any number of places. Power thus concentrated in one place in the cheapest manner, and then led away to be employed in many places, would be inconceivably cheaper than the use of so many separate steam engines in all the places where motors are needed, and, in addition, there would be greater safety everywhere by avoidance of the multiplicity of smoke and fire. One of the immediate purposes to which it is intended to be applied is to circulate water in a public aquarium now being erected in Scotland, where the necessary stream will be supplied from a mountain loch or lake. The idea of such an engine pell-mell, day and night, without need of manual attention (or ringing a signal bell if such attention is needed), and thus unceasingly lifting 10,000 gallons of water an hour, at scarcely any cost, will be quite a triumph of mechanism. But the greatest advantage of all, and the one which this Hercules engine alone can possess, is this, that in case water should fail from any cause, as repairs to pipes, seasons of drought, etc., steam can be applied to the engine with no more delay than is necessitated by the lighting of a boiler.

Safety on Railroads.

Apropos of the Plimsoll stir in England, which is likely to result in better protection for the seamen of the British merchant service, the Philadelphia *Press* takes up the claims of a much larger class of men, whose calling is equally hazardous, and for whose protection there is, if possible, even less provision—the railroad freight train men. Says the *Press*:

This honest desire to protect poor Jack, and secure for him the treatment which his gallant services deserve, is manifested with warmth on both sides of the Atlantic, and while the subject is now up for discussion, we deem it a proper time to call some attention to a similar subject, in which the personal comfort and safety of life and limb of as useful a class of men as sailors are largely interested. We allude to the crews which run the freight trains on the railroads of the United States. If it is necessary in England and the United States to exercise vigilance and enact laws to prevent seamen from being floated out of port in crazy vessels, unseaworthy and chary in their character, we are also convinced that it is now time for government to pay some attention to the character of the cars on which conductors, brakemen and flagmen are so often compelled to do duty. There is no class of men exposed to greater danger than those who do duty on railroad freight trains. The platform of a freight car, to which the bumper is attached, is never wider than a man's foot, and from daily collision is frequently in a broken condition. On the platform the brakeman is compelled to do duty. If he passes over the train, the means of gaining the top of a car are in nearly all cases much more frail and insecure than those afforded a sailor to go aloft. On the top of covered cars a narrow board is all the passage-way the crew have to go from one end to the other of the trains. In the winter these means of operation for conductors and brakemen are rendered still more perilous by ice and sleet, adding danger to men who are regarded as criminal if they hesitate or shrink in the face of certain death to do their duty. Those who have any curiosity to investigate this subject will find ample objects of study in the "yards" of any of the railroads which center at this point. It will surprise the public to learn how little regard is had for the lives and limbs of those who run railroad trains. Inventive genius is sought for modes to save oil, for economy in working a train, and for means to protect machinery, but in the matter of affording protection to human life engaged to manage their vast movements no interest whatever is manifested. If a conductor or brakeman is killed or maimed his place can be readily filled from a score who are always in readiness to go into a vacancy. It does not cost money to supply a carrying company with

men, and therefore it is not the interest of those at the head of such corporations to provide for their protection; but when it comes to machinery and rolling stock—that's a different thing—cost only can provide it.

The only thing surprising about this matter is that it has never been seriously taken up before. Scarcely a day passes that the telegraph does not bring us news of brakemen killed while coupling cars, or by falling under them while in motion, or by being struck by bridges while passing under them, or in some one of the numerous ways in which death comes to them; and if, by reason of the commonness of such occurrences, the telegraph fails to report them, every day's mail is sure to do so. A dozen train hands to one sailor lost would be a low estimate.

It has only been since Mr. Gowen became President of the Reading Railroad that "caboosees" have been attached to the freight and coal trains on that road, previous to that time the unhappy brakemen were compelled to face storm or sunshine, cold or hot, dark or daylight, without any protection whatever, through the ten tedious hours consumed on the trip from Port Carbon to Richmond. One road that we know of—the Pennsylvania—has a device to warn men on top of freight trains of the vicinity of a bridge. But the other dangers to which the *Press* alludes are still unrelieved, and many a brave man goes to his death because of criminal negligence on the part of railway companies.

As the *Press* suggests, the love of money is the root of the evil. It should be remedied by an appeal to the same passion. Let it be made compulsory for each railroad company to pay damages, say \$1000 for each man killed, and a proportionate amount for injuries—no "cut-throat agreement" on the part of the men to be binding on their legal representatives—and it would be a very short time before safety devices on freight trains would come into general use, and the annual lists of "employees killed" in the reports, would be very materially shortened.—*Pottsville Miner's Journal*.

The Warner Process.

Mr. Arthur Warner, in a letter to *Engineering*, gives the following account of the practical working of his process:

As some parties have disputed the accuracy of some of the statements I have made in your journal, more especially with reference to the consumption of coal when puddling refined iron in the Dandy furnace, and also as to the number of heats made per shift, I would just observe that I have had permission from the Bowing Iron Company to state that they puddle only cold blast refined iron, the average analysis of which I give below. They use a Dandy or small oven attached to the ordinary puddling furnace, in which the charge is previously raised to a red heat, 10 heats per shift are obtained with a consumption of 14 cwt. to 16 cwt. of coal per ton of puddled bars; no scrap iron, and only a little fetting at the end of each shift are employed. This precisely confirms the statements made respecting the puddling of Cleveland refined iron refined by my process, and puddled at the Kirkstall forge in a Dandy furnace, the analysis of which was as follows:

Bowing Cold Blast Refined.	Warner's Cleveland Blast Refined.
Carbon.....	3.034
Silicon.....	0.21
Manganese.....	0.038
Phosphorus.....	0.423
.....	0.306

The quantity of fetting and scraps used in the Cleveland and other districts is dependent upon the amount of silicon in the iron. When my calculations were made, I obtained my figures from well known houses as the results of their working, but each manufacturer can fill in his own figures from the average of a year's working, and compare with the working of refined iron.

Warner's Cleveland Refined or South Yorkshire Cold Blast Refined.	Cleveland Unrefined Iron.
10 heats a shift. 14 to 16 cwt. of coal. 2 cwt. of fetting. No scrap iron. 1 cwt. loss in puddling. Puddlers' wages. 1½ cwt. loss in mill.	6 heats a shift. 24 cwt. of coal. of fetting. loss in puddling. Puddlers' wages. loss in mill.

The cost of refining will vary from 5/ to 6/ according to the purity of the iron, position of the furnaces, and other circumstances.

Whatever the average saving may be upon the three million tons puddled annually in Great Britain, whether 5/ or 20/, it is an important matter for our iron masters to consider at a time when such heavy losses are being made.

If forge owners were to avoid purchasing all accidentally made forge iron with 2½ to 3 per cent. of silicon, made when burdening for foundry, and confine themselves to buying from those furnaces burdening for forge, and the iron which contains only 1½ per cent. of silicon, there would be no more disputes with the puddlers about bleeding, and the consumption of scraps and fetting would be greatly reduced.

Machinery Wanted.

Wanted a second-hand steam engine of about 125 horse-power, either upright or horizontal, with boilers and blast furnace blowing apparatus of equal capacity. Must be of good make and in perfect condition. Apply to

H. R. KNOTT WELL,
New Haven, Conn.

Wanted.

A first-class experienced business man as traveling or local salesman for Railroad, Builders' and Boiler Makers' supplies.

State experience, references and salary required.

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To the Hardware & Cutlery Trade.

MESSRS.

Bissell, Welles & Millet,
AUCTIONEERS,

Will hold a Large Special Sale
OF

HARDWARE, CUTLERY AND HOUSE
FURNISHING GOODS.

On Tuesday, Aug. 31, & Wednesday, Sept. 1,

At their Salesrooms,

NO. 15 MURRAY STREET,

The lines of goods that are to be sold will be in great variety, and direct from Manufacturers and Importers. Southern and Western cash buyers should not fail to attend. Catalogues will be issued early.

Furnace Engineering,
Plans, Estimates and Superintendence
FOR BUILDING OR REPAIRING.
Reliable Analyses Furnished, and Advice
given concerning the Value of Materials,
Best Mixtures & Methods of Working.
Special Attention paid to Investigating Cases
of Unsatisfactory Results.

Furnace companies supplied with first-class men for all positions. Competent managers and founders desiring situations are requested to send full particulars. Correspondence solicited on all topics of interest in furnace work. Letters answered promptly without charge. Address,

EDWARD J. HALL, Jr., Blast Furnace Engineer,
452 Franklin Street, BUFFALO, N. Y.

For Sale, Hardware Store.

A first-class Hardware Store for sale, wholesale and retail, situated in best part of the city, on main street, opposite door on south side of street, one opposite and one four doors distant, store well established; investigation invited. Satisfactory reasons given for selling. Capital required about \$10,000. Address H. H. HARDWARE,
No. 71 Federal St., Allegheny, Pa.

Briesen's Patent Agency
FOR SECURING INVENTIONS, TRADE
MARKS, &c., IN AMERICA
AND EUROPE,
No. 258 Broadway, New York.
A. V. BRIESEN.

TO LET.

A Light, Handsome Office.
Possession Immediately.

HERMANN BOKER & CO.,
101 Duane Street, N. Y.

REMOVAL.

We have removed our office and stock of Cutlery to

107 Duane St.
PETERS BROTHERS.

CLASSIFICATION LISTS
OF
American Hardware.

A book of tables and information of use to every one in the Hardware trade.

PRICE, \$2.00 PER COPY.

Send cash for the book, or write for circular giving table of contents. Also Discount Glass Lists, 75c. each. Address, W. M. HULL,
Detroit, Mich.

10 heats a shift.
14 to 16 cwt. of coal.
2 cwt. of fetting.
No scrap iron.
1 cwt. loss in puddling.
Puddlers' wages.
1½ cwt. loss in mill.

6 heats a shift.
24 cwt. of coal.
of fetting.
loss in puddling.
Puddlers' wages.
loss in mill.

The cost of refining will vary from 5/ to 6/ according to the purity of the iron, position of the furnaces, and other circumstances.

Whatever the average saving may be upon the three million tons puddled annually in Great Britain, whether 5/ or 20/, it is an important matter for our iron masters to consider at a time when such heavy losses are being made.

If forge owners were to avoid purchasing all accidentally made forge iron with 2½ to 3 per cent. of silicon, made when burdening for foundry, and confine themselves to buying from those furnaces burdening for forge, and the iron which contains only 1½ per cent. of silicon, there would be no more disputes with the puddlers about bleeding, and the consumption of scraps and fetting would be greatly reduced.

The 44th Exhibit of the American Institute will open September 5th; Machinery will be received after August 1st, with notice after August 25th. For particular address "General Superintendent, American Institute, New York."

INDUSTRY,
Office of *The Iron Age*, 10 Warren St., N. Y.

Upright Corliss Engine, 32 in. cylinder, 5 ft. stroke; wheel, 32 tons, 25 ft. diam.

Puddling Train, Merchant Train, 16 in., built by Totten.

Heavy Squeezers, Etc., Etc.

Testing Machine.

Bolt Cutters.

Milling Machines, and all Machinery necessary for Bridge Work. In lots to suit. Apply to

W. M. COFFIN & CO.,
8 Oliver Street, Boston.

DISCOUNT LISTS.

W. Butts & C. Butts, 19 discounts.....each 75c.

Iron Screws & C. & P. Bolts 13 discounts.....75c.

DAYTON & LAMBERTON,
97 Chambers Street, N. Y.

CHARCOAL FURNACE FOR SALE

Near Cartersville, Ga. Complete, ready to run.

With Brown Hematite Ores, greatest abundance.

Also two beds Manganese—lands in fee simple.

Price, \$12,000—offered at this figure only because it must be sold at once.

S. B. LOWE, Chattanooga, Tenn.

SPECIAL NOTICE.

I have three patents for Dies, Machinery, and Tools

for making Augers and Bits, each running seventeen years; date as follows: No. 1, April 1, 1871; No. 2, June 1, 1872; No. 3, January 1, 1873.

There is a special claim on each of the Dies. All persons in

claiming on said patents will be held responsible to the extent of the law.

Russell Jennings,
Deep River, Conn. Sept. 7, 1874.

Charcoal Blast Furnaces.

Having during the past 10 years constructed and put in operation a number of the most successful Charcoal Blast Furnaces in the country, and having a competent corps of workmen constantly on hand, am enabled to offer advantages in constructing or remodeling upon the latest and most approved plans.

Examinations of Furnace Property made and reported upon when solicited. Correspondence promptly attended to.

J. M. WHITE, Engineer,
22 W. Alexander St., Rochester, N. Y.

Translator for Manufacturers and
Land Companies,

from and into the

ENGLISH,

SPANISH,

FRENCH,

and GERMAN.

Spanish Catalogues got up correctly and with des-

patch. Address, C. KIRCHHOFF,

Metal Reporter of "The Iron Age,"

Box 3091, N. Y.

Specimen Copies sent free.

The undersigned is also

Trade Report.

Office of THE IRON AGE

WEDNESDAY EVENING, August 11, 1875.

The past week has been one of uninterrupted quiet in Wall street, notwithstanding an attempt on Friday to create an excitement by the circulation of "canards" respecting the credit of certain prominent banking firms, but which accomplished nothing more serious than causing a temporary decline of 1 @ 3 per cent. in speculative shares. In other respects the week has been comparatively uneventful. The only failure of prominence was that of Archibald, Baxter & Co., grain dealers.

The money market continues easy, with 1½ @ 2½ per cent. as the rates to borrowers on call, and 4 @ 5 per cent. discount on prime commercial paper.

The gold market has been strong, with a range of 112½ @ 114. The Treasury sales for the week have amounted to \$1,500,000 at 113½ @ 113⅓. The following shows the daily range of the premium:

	Highest.	Lowest.
Thursday.	113½	113
Friday.	114	113½
Saturday.	113½	113½
Monday.	113½	113½
Tuesday.	114	113½
Wednesday.	114	113½

The bond market has continued quiet, and prices have moved in sympathy with gold. There continues moderately active demand for desirable railway mortgages. We give below the closing quotations of governments.

The stock market was somewhat irregular early in the week, but settled down into steady dullness. The principal dealings have been in Western Union, Lake Shore, Pacific Mail, Ohio & Mississippi and Northwestern. We give below the highest and lowest quotations of shares on the active list.

The bank statement shows a decrease in total reserve of \$1,335,500, and in surplus reserve of \$1,434,675, the banks now holding \$27,070,000 more lawful money than the law requires. The following is a comparison of the bank averages for the past two weeks:

	July 31.	Aug. 7.	Differences.
Loans.	\$1,335,700	\$1,334,900	Inc. \$1,800
Specie.	15,730,200	16,334,400	Inc. 597,200
Lg. tend.	75,504,000	73,601,300	Dec. 1,932,700
Deposits.	251,066,100	251,468,800	Inc. 396,700
Circulation.	18,576,100	18,581,800	Dec. 54,900

The following tables show the foreign trade movements for the week:

	Imports.	Exports.
Total for week.	\$6,985,841	\$7,000,076
Prev. reported.	545,558,050	246,383,750
Since Jan. 1.	520,543,901	253,393,496
	210,690,923	

Among the imports of general merchandise were articles valued as follows:

	Quant.	Value.
Anvils.	12	\$125
Bright goods.	6	962
Bronzes.	25	5,520
Chains and anchors.	94	6,197
Copper.	2,250	2,250
Cotton.	73	22,420
Guns.	99	15,509
Hardware.	33	2,846
Iron, pig, tons.	500	17,307
Iron, sheet, tons.	97	17,134
Iron, R. R. bars.	994	18,406
Iron tubes.	8	160
Iron wire, tons.	372	572
Lead, pigs.	35	2,517
Metal goods.	4,485	26,516
Nails.	308	23,309
Needles.	17	9,757
Old metal.	564	564
Platina.	1	4,350
Plated ware.	1	400
Pins.	19	2,467
Steel.	2,813	22,165
Silverware.	4	219
Tin, boxes.	10,400	72,364
Tin, slabs, 2,000.	198,700	35,619
Wire.	117	2,779
Zinc.	11,060	768

EXPORTS OF SPECIE.

	Total for the week.	\$1,123,918
Previously reported.		59,912,986

Total since January 1, 1873.

Same time in 1874.

Same time in 1873.

Same time in 1872.

Government bonds at the close were firm at the following quotations:

Bid.	Asked.	
U. S. Currency 6%.	122½	
U. S. 6s 1881, reg.	130%	
U. S. 6s 1881, cou.	131%	
U. S. 5-30 1864, reg.	116%	
U. S. 5-30 1864, cou.	116%	
U. S. 5-30 1864, reg.	119%	
U. S. 5-30 1864, cou.	119%	
U. S. 5-30 1865, new.	119%	
U. S. 5-30 1865, cou.	119%	
U. S. 5-30 1867, reg.	130%	
U. S. 5-30 1867, cou.	130%	
U. S. 5-30 1868, reg.	121	
U. S. 5-30 1868, cou.	121	
U. S. 10-40 reg.	114%	
U. S. 10-40 cou.	118	
U. S. 1881, reg.	116	
U. S. 1881, cou.	116%	
The following were the highest and lowest prices of stocks to-day:		

Highest. Lowest.

	Highest.	Lowest.
N. Y. Cen. & Hudson Consolidated.	104	104
Lake Shore.	60%	59
Roe Island.	105%	105%
Del. Lech. & Western.	130	120
Michigan Central.	68%	62
C. & P. & P. & P. Pittsburgh.	50%	48
Wabash.	6%	6%
Western Union Telegraph.	81	81
Atlantic and Pacific Telegraph.	19%	19%
Northwestern.	41%	41%
Pref.	54%	54%
Milwaukee & St. Paul.	36%	36%
Pref.	59%	59%
Pacific Mail.	14%	14%
Erie.	19%	18%
Ohio & Mississippi.	71%	71%
Union Pacific.	71%	71%
Kansas Pacific.	11	11
Missouri Pacific.	44	44
A. & M. & P. Pacific Pref.	18%	11
United States Express.	42	41%

GENERAL HARDWARE.

The changes in lists and discounts during the week have been few and unimportant. A good many buyers from the West and Southwest are in town, and some of our city houses bear unmistakable evidence of improving business. The discouraging accounts from some sections, regarding the recent floods, has had a very depressing influence, but it is believed here that, although great damage has been done, the misfortune has been greatly exaggerated, and already a reaction is felt, and a better demand for

goods from those sections is being realized. From the Northwest the reports are of the most cheerful nature, and buyers from that section expect a heavy business this fall. A correspondent, writing from the Southwest, says: "Trade in general lines, through the central Mississippi Valley, light; business dull, owing to recent heavy rains; good trade from South and Southwest."

Foreign Hardware participates in the general improvement, and prices remain unchanged. Hermann Boker & Co. have taken the exclusive agency for H. Wilkinson's Warranted C. S. Screw Drivers (American). They have a full assortment of these goods in stock.

Henry Diston & Sons invite the attention of the trade to their large assortment of Framed Wood Saws, Saw Handles, etc. These goods are manufactured from thoroughly seasoned lumber, and are offered to the trade at prices to suit the times. In their advertisement on page 29 they illustrate some of their styles of Wood Saw Frames, and their well known patterns of Cross Cut Saws.

The demand for Nails continues inactive, and prices remain at about the quotations of last week. Some brands of Nails are firmly held at \$3.25 for 10d., while other good brands can be readily obtained at \$3.20. We quote 10d., in large or small lots, \$3.20 @ \$3.25 net.

Fernald & Sise have taken the agency, in this city, for Wright's Patent Tin Sieves, which they offer to the trade at the following list, less discount 20 and 5 per cent.:

Wright's Patent Tin Sieve.

Price List.

No. 1, 18 inch, weigh 14 lbs. per dozen.

Annealed. Plated.

No. 14 Mesh. \$4.00

No. 16 " 4.25

No. 18 " 4.50

No. 20 " 4.75

No. 24 " 5.00

No. 1, 11 inch, weigh 11 lbs. per dozen.

Annealed. Plated.

No. 14 Mesh. \$4.25

No. 16 " 4.50

No. 18 " 4.75

No. 20 " 4.90

No. 24 " 4.95

These Sieves are strongly packed, one dozen in a box, and are shipped as hardware. Having increased our facilities for manufacturing, we will now fill all orders on short notice.

John C. Jewett & Sons, Buffalo, N. Y., have issued the following Appendix "A" to their Illustrated Catalogue, under date of 2d instant. As it contains a number of new and seasonal goods we reproduce it entire. All of the goods in this Appendix, except those marked "net," are subject to discount 25 per cent. In their advertisement on page 25 we illustrate their "Utility" Covered Coal Hods and new style of Coal Vase, which are worthy of attention.

Bruce's Patent (New York) Vase for Hard Coal.

Patented June 30, 1874.

This Improved Vase will be found superior to anything hitherto before the public as a Parlor Vase to feed a fire grate or stove with Anthracite Coal, as you have only to shovel coal from the front opening, avoiding the inconvenience of lifting a heavy hot or of tipping over the old style Vase to shovel coal therefrom.

No. 40 A. Assorted Finish, each. \$7.00

No. 45 A. Assorted Finish, with Jewett's Patent Fire Set Attachment, each. \$8.00

Bruce's Patent Coal Vase with two Compartments for Bluminous Coal—Patented June 30, 1874.

The front receptacle is for Lump Coal: the rear one for fine Coal, the latter falling into the basement, where it is readily reached with a shovel through the opening in front of same. The two descriptions of Coal not interfering with each other.

No. 30 A. Assorted Finish, each. \$7.50

No. 35 A. Assorted Finish, with Jewett's Patent Fire Set Attachment, each. \$8.50

Jewett's Coal Vase.</

METALS.

Copper.—There have been sold during the week 300,000 pounds Lake Superior, on the spot, and not later than the end of this month, at 23c., at which the market may be pronounced decidedly stiff, for who soever wants any Copper has to pay this figure. Baltimore is also firmly sustained at 23c., with moderate sales. Nothing transpires in Copper "futures," we quote all September nominally 23c. for Lake Superior; none offering. The sentiment which pervades the metal markets in general, and the Copper market in particular, is one of firmness and confidence in the future. Metals are not in large stock, either in first or second hands, and where there is a concentration of more considerable amounts, the parties interested are strong, and have faith in the article controlled by them. In manufacturers' hands stocks have run notoriously low, lower, indeed, than is usually the case, and consumers at large may be looked upon as better off than they were a year ago. The prospects of remunerative prices for all sorts of agricultural produce are more promising than they have been for some time past; the arguments that are put forward in favor of better times coming, consequently, seem plausible enough. But the most encouraging feature in connection with the metal trade that can be shown, is the almost total absence of speculation by weak parties for a year past. Nothing so surely undermines confidence in an article for a time as the knowledge that it is artificially bolstered up by parties at the mercy of others and of the money market. The manufacturer is in constant dread of a sudden breakdown, and while the break lasts he is seldom the one who will be benefited by the extreme depression, for powerful operators will then step in and buy at bottom figures. London telegraphs £81 for Chilli Bars, which is a slight improvement. Copper in the manufactured state is steady as follows: New Copper Sheathing, 30c.; Bolts and Braziers', 31c.; Bronze and Yellow Metal Sheathing, 23c.; and Bolts, 25c.

Tin.—The firmer feeling in our midst we alluded to in our last report has made further headway, and it would not be an easy matter to buy at anything below the following quotations for large lots: Straits, 18½c., gold; English Refined, 19c.; ditto Common, 18½c. @ 18½c.; and Banca, 23c., all gold. The London quotation by cable is £79. It is pretty generally admitted, both in Europe and here, that at the almost unprecedentedly low price that has been ruling throughout the year thus far, consumption has increased in a manner not deemed possible a year ago, and this in spite of the otherwise dull times. A metal that has thus been more generally adopted is not likely to be discarded again the moment it improves ten or even twenty per cent. from the lowest price it has been temporarily depressed to, partly by speculative manipulation; it takes too firm a hold upon the consumer, who may have made expensive changes in his modes of manufacture, not to be lightly set aside. Looked upon from this point of view the metal may enter upon a period very essentially different from the dreary one it has traversed during the past two years, inasmuch as consumption may soon prove equal to the increase of production, on which so much stress has been laid. The great Tin problem that has puzzled the metal trade for over two years may thus be satisfactorily and lastingly solved. The business in Tin has been confined to a moderate jobbing trade, and the same may be said with reference to Tin Plates, which are quiet at the following gold quotations, per box, for larger lots: Charcoal Bright, \$8.00; ditto Terne, \$7.25 @ \$7.37½; Uoke Tin, \$6.75 @ \$7.00; and ditto Terne, \$6.50, all gold.

Lead.—This metal is slow in assuming the more prominent part it usually plays at this time of the year; yet its position may be called an intrinsically good one, the trade and consumers carrying but an insignificant supply, while the stock in first hands is known to be well held, and is certainly not excessive. It will not require much of an improvement in the demand, and the market will undergo a radical and favorable change, the trade, through pressuring necessities, then, no doubt, showing anxiety to stock up for their fall requirements. Even ere the present month comes to a close the revival may be at hand. We have, meanwhile, been flat, with Domestic at 5½c., gold, with sales of 100 tons. St. Louis is firm. European accounts are also generally firm. We quote Foreign here at 6½c. @ 6½c., gold, nominally. Manufacturers of Lead are steady at the following quotations: Bar, 8½c.; Pipe, 9½c.; and Sheet, 9½c., less 10 per cent. to the trade.

Selter and Zinc.—Makers of Domestic Selter, in jointly reducing the previous figure to 7½c., currency, 30 days, or less 1 per cent. for cash, hoped to impart some stimulus to the demand for their product, but it seems that some outside parties who purchased at the time of the article's extreme depression, early in the year, are still able to undersell the combination people, and, to a considerable extent, satisfy the consumptive demand, moderate as it is, at the price of 7½c., currency. Of "Silesian Union" Foreign a lot of 5 tons sold below the market to close out an invoice. We bear of no other sales, and continue to quote 7½c. @ 7½c., gold. Accounts from Hamburg are to hand by letter to July 24, calling the market quiet, but firm. Sheet Zinc is moderately active at 8½c. @ 9c., gold, as to size.

Antimony.—London quotes £58. A fair, steady business is doing all the while at 13½c. @ 13½c., gold, for Foreign, while Domestic is reported as selling at 13c., gold.

COAL.

The market for Anthracite Coal continues fairly active. Supplies are increasing, and dealers are running off stocks quite rapidly, now being the time that consumers usually lay in their supplies for the coming winter. Lump, Steamer, and Broken Coal still continues slow of sale, and will no doubt remain so until there is a revival of manufacturing interests; the outlook for which now seems a little brighter, and may soon cause a demand for

them. Foreign Coals are dull, and there is less inquiry than usual, owing to the cheapness of Domestic. Cumberland Coal meets with a fair demand at easier rates.

The following are the circular prices fixed by the Coal companies which are represented by Frederick A. Potts, 110 Broadway, for delivery during the month of August:

SHIPPED FROM PORT JOHNSON, ELIZABETHPORT, BOBOKEN, BONDOUT, TRENTON AND FERTHER AMBOY.

	Lump.	Steamer.	Broken.	Egg.	Stove.	Chestnut.	Charcoal.	No. 2.
L. & W. C. Co.'s.	\$ 5 0 0 5 10 20 5 45 5 90 4 90 4 00							
Wilkinson Co.	5 0 0 5 10 20 5 45 5 90 4 90 4 00							
L. & W. C. Co.	5 5 5 5 5 5 5 5 90 5 10 4 00							
Old Co. Leigh.	5 5 5 5 5 5 5 5 90 5 10 4 00							
L. & W. C. Co.'s.	5 5 5 5 5 5 5 5 90 5 10 4 00							
Plymouth Red Ash	5 5 5 5 5 5 5 5 90 5 10 4 00							
L. & W. C. Co.'s.	5 5 5 5 5 5 5 5 90 5 10 4 00							
Honeybrook Le-	5 5 5 5 5 5 5 5 90 5 10 4 00							
high.	5 5 5 5 5 5 5 5 90 5 10 4 00							
b. L. & G. Co.	5 5 5 5 5 5 5 5 90 5 10 4 00							
Scranton.	5 5 5 5 5 5 5 5 90 5 10 4 00							
Lackawanna.	5 5 5 5 5 5 5 5 90 5 10 4 00							

The quantity of Coal sent from the Schuykill region the last week was by rail 125,651 tons; causal, 41,980 tons; for the week, 167,631 tons, against 129,013 for the corresponding week last year. Increase, 35,618 tons.

The supply sent from all the regions so far this year foots up 11,063,404 tons, against 12,628,962 tons to same period last year. Decrease, 1,565,558 tons. The decrease in Anthracite is 1,813,875 tons.

We quote as follows: Anthracite, \$4.90 @ \$5.90; Cumberland, \$6.25 @ \$6.75; West Virginia, \$6.75 @ \$7; James River Steam, \$6.25; James River Carbonate, \$9 @ \$9.50; Kanawha House, \$11.50; American Gas, \$6.75 @ \$7.25; American Cannel, \$12 @ \$14; Pennsylvania and Westmoreland, \$6.75; Murphy Run, \$6.50; Newburg Orel, \$6.50; Sterling Ohio, \$10; Ince Hall, \$17 @ \$18; Liverpool House Cannel, \$17; Liverpool Gas, \$12; Newcastle Gas, \$7.50; Scotch, \$7.50 @ \$8.

IMPORTATIONS.

Of Hardware, Iron, Steel and Metals into the Port of New York, for the week ending Aug. 10, 1875:

Hardware.	
Booth R. W. & Co.	
Cacks, 5	
Guns, cs. 3	
Besels & Chasels, Boxes, 5	
Blumenthal I. & A. Mdse. pkgs. 2	
Boker Hermann & Co. Mdse. pkgs. 31	
Lang W. Bailey & Co. Bundles, 250 Bars, 1	
Lenger E. S. & Co. Bale ties, lots, 350 Lumide C. G. Bars, 436 Bundles, 446 Langhland & Co. Hay bands, bds., 367 Nayler & Co. Bars, 10, 364 Phelps Dodge & Co. Sheet, bds., 76 Prosser Thos. & Sons. Tubes, bds., 71 Williston, Knight & Co. Boxes, 100 Wilson & Asmus. Scrap, tons, 14 Orders Packages, 740 Pig, tons, 400 Bars, 1342	
Folsom H. & D. Arms, cs. 9	
Franklin & Co. Mdse. pkgs. 5	
Field A. & Co. Mdse. pkgs. 1 Packages, 36 Anvils, 50 Cases, 26	
Harmar N. & Co. Mdse. pkgs. 2 Hutchings J. W. Arms, cs. 23 Cases, 2 King, Briggs & Co. Per. caps, cs. 1 Cases, 3 Lever Bros. Cases, 2 Ley & Co. Cases, 2 Mills & Gibb. Cases, 2 Moore D. & Co. Cases, 3 Merchant Dispatch Co. Boxes, 5 Cases, 10 Moore J. P. Sons. Gun wads, cs. 19 Guns, cs. 4 Meyer & Raster. Cutlery, cks., 2 Cases, 3 Arms, cs. 14 Peters Bros. Mdse. pkgs. 4 Rosenthal J. & Co. Cases, 9 Packages, 3 Remington E. & Sons. Guns, cs. 2 Ronkin C. & Sons. Cases, 3 Sawyer John. Wire rope, coils, 1 Schoveling & Daly. Mdse. pkgs. 2 Arms, cs. 20 Cases, 7 Samuels Geo. & Co. Packages, 117 Smith, Cohen & Co. Cases, 30	
Brown, Shipley & Co. Bars, 1000 Brown Wm. Cases, 26 Bundles, 86 Dana & Co. Scrap, bds., 347 Hogan John. Bars, 2 Scrap, bds., 3 Taylor & Co. Cases, 5 Tires, 12 Prosser Thos. & Sons. Scrap, bds., 37 Hogans, 2 Phillips Dodge & Co. Bundles, 180 Bessemmer, bds., 190 Robbins C. & Sons. Bundles, 116 Saxton, Seabury. Cases, 1 Spring, cs. 1 West, Bradley & Cary. Mfg. Co. Bundles, 85 Woodford W. O. Cases, 33 Wood & Leggett. Wright C. L. & Co. Cases, 16 Order. Casks, 2 Bundles, 33 Cases, 3 Metals. Bruce & Cook. Tin plates, bxs., 2975 Trost R. & Co. Tin plates, bxs., 735 Van Wart & McCoy. Cases, 5 Mds. pkgs. 1 Wood & Leggett. Chains, pos. 91 Chains, cks., 65 Tools, bds., 16 Files, 16 Wheeler E. S. & Co. Wire rods, 966 Wiebusch & Hilger Mfg. Co. Mdse. pkgs. 21 Packages, 14 Chains, cks., 75 Mds. pkgs. 6 Cases, 3 Williams John & Co. Wire rope, coils, 10	
Brace & Cook. Tin plates, bxs., 2975 Byrne John & Co. Tin plates, bxs., 735 Corr. N. & Co. Tin plates, bxs., 807 Dickerson, Van Dusen & Co. Tin plates, 1067 Tin Ingots, 323 Tin terne plates, bxs., 197 Hayes, G. Zinc, cks., 1 Leycraft & Co. Copper, bbls., 4 Copper, ca. 1 Lamarche H. & Co. Zinc, cks., 125 McAvoy H. L. Shovel, cs. 3 Phelps Dodge & Co. Tin plates, bxs., 5147 Ryne J. & W. Wilson Bros. Scrap, pkgs. 20 Wheeler E. S. & Co. Tin plates, bxs., 500 Order. Tin plates, bxs., 3831 Terne plates, bxs., 250 Zinc, cks., 73	
Brand Jas. Fig. tons, 100 Brown Bros. & Co. Bars, 4657	

OLD METALS, PAPER STOCK, &c.

Business in this market continues very quiet, and quotations remain about the same as last reported, with the exception of Gunny Bagging, which is scarce in the market and has advanced ½ cent a pound. The Rag and Paper Stock market is dull and declining. There is a fair demand for Woolen Rags, but other articles are in little request. We quote the following as the current purchasing rates:

Old Metals.—Copper, 16c. @ 17c. per lb.; Yellow Metal, 11c.; Brass, 10c. @ 12c.; Composition,

heavy, 13c. @ 14c.; Lead, solid, 5½c.; Tea Lead, 4½c.; Zinc, 4½c. @ 4½c.; Pewter, No. 1, 18c.; do., No. 2, 8c. @ 12c.; Spelter, 5c. @ 5½c.; Wrought Iron, 1c.; Sheet do., ½c.; Cast do., ½c.; Machinery, do., ¾c.

Rags.—Canvas, Linen, 4½c. @ 5½c.; do. Cotton, No. 1, 6½c.; No. 2, 4c.; Colored, do., 2c. @ 2½c.; Mixed, Woolen, 2c. @ 3c.; Soft, do., 5c. @ 5½c.; Gunny Bagging, 1½c.; Jute Butts, 1½c. @ 2c.; Kentucky Bagging, 3c.; Book Stock, 3c.; Waste Paper and Scraps, 1½c.; Kentucky Bag Rope, 4c.; Oakum Jute, No. 1, 4½c. @ 5c.; do., No. 2, 3c.; Tarred Shaking, 1c. @ 1½c.; Grass Rope, 2½c. @ 3c.

PITTSBURGH.

PITTSBURGH, Aug. 10, 1875.

PIG IRON.—There is little or nothing to record that is really new or important; business continues very quiet, as it usually is at this particular time, but it is hoped and expected that there will soon be an improvement. The consumption has been comparatively light for several weeks past, as some of the mills have been stopped to take stock, others to make repairs, and as they are nearly all buying only to supply immediate necessities, it is evident that they have little or no stock. The general position of the market heretofore is favorable to the producer; stocks, both in first and second hands, are very much reduced. The consumption is in excess of the production, and while mill owners cannot yet see their way clear to stand any additional cost on the raw article, the outlook warrants the prediction that when there is a change it will be upward. The feeling very generally prevails that Pig Iron, as well as its products, have touched the lowest notch, and the fact of this feeling prevailing, leads to the belief that there will be an improved trade this fall. We continue former quotations: No. 1 Foundry, \$27 @ \$28; 4 mos.; No. 2, \$25 @ \$26; Gray Forge, \$24 @ \$25; White and Mottled, \$22 @ \$23.

MANUFACTURED IRONS.—There is but little to record in connection with the market for finished Irons, excepting that the output is not as bright as it was a week ago, in consequence of the damage done by the recent disastrous floods in some sections of the country to the crops. The expectations of our manufacturers of a good fall and winter trade were based largely upon good crops, and while there is no question but the damage sustained has been very great, the reports in relation thereto have, no doubt, been exaggerated, and we do not believe that the consumption of Iron is likely to be much affected thereby. Trade just now is only fair, although about all it usually is at this particular time; some of the mills are stopped, taking stock and repairing.

NAILS.—There is no special activity in the Nail trade, nor is it to be expected at this particular time; the majority of the factories are stopped, taking stock and making repairs, but they will all, or nearly so, be in operation within the next week or two. It is believed, in view of the fact that stocks are small both in first and second hands, that there will be a good fall trade; as the feeling is gaining ground that prices have touched the lowest notch, it will not be without its effect in stimulating the demand. The market is quoted steady at \$7.55, 30 days, and \$7.40, prompt cash, all currency.

SCRAP IRON.—There is little to record in connection with the market for finished Irons, excepting that the output is not as bright as it was a week ago, in consequence of the damage done by the recent disastrous floods in some sections of the country to the crops. The expectations of our manufacturers of a good fall and winter trade were based largely upon good crops, and while there is no question but the damage sustained has been very great, the reports in relation thereto have, no doubt, been exaggerated, and we do not believe that the consumption of Iron is likely to be much affected thereby. Trade just now is only fair, although about all it usually is at this particular time; some of the mills are stopped, taking stock and repairing.

STAINLESS IRON.—There is very little to report in this regard.

LEAD.—Lead is in very light request, but held a trifle steadier. We quote Pig, 6c. for Domestic, and 6½c. for Foreign; Sheet and Pipe Lead, 6½c., currency; Tin Line, 16½c.; Bar Lead, 6½c., less usual trade or 10 per cent discount.

ANTIMONY.—Antimony is firm with very little inquiry, quoting from 13c. to 13½c. as to lots bought. Spelter is strong and extremely dull at \$7.55, 30 days, and \$7.40, prompt cash, all currency.

PLATES.—Plates are active; we quote Charcoal, 18½c.; American Machinery, 9½c. to 10c.; Cast Tires, 7c. to 7½c.; English Tool, 16c. to 17c. Copper is doing little or nothing here, while the mining companies are arranging to lessen production after August 10. The manufacturers who come into the market still are enabled to supply their wants almost wholly out of old metals, where they prefer to buy, trusting thus to break up the combination which holds values in ingot form at 23c. For manufactured we quote New Sheathing, 3c.; Bolts and Braziers, 3c.; Yellow Metal Bolts, 20c.; Bar Lead, 6½c., less usual trade or 10 per cent discount.

IRON.—Iron is in very light request, but held a trifle steady. We quote Pig, 6c. for Domestic, and 6½c. for Foreign; Sheet and Pipe Lead, 6½c., currency; Tin Line, 16½c.; Bar Lead, 6½c., less usual trade or 10 per cent discount.

CHARCOAL

ing establishments there were altogether in 1872 36, employing 975 hands, 35 works being Prussian, and one Saxonian. The following have been the quantities of metallic Spelter produced:

Cts.	Cwts.
1866	1,396,339
1864	1,384,956
1862	1,329,802
1865	1,304,419
1867	1,277,470
Annual average production,	61,679 tons, English.

(Borsenblatt.)

HAMBURG, July 24, 1875.—*Metals—Consumption* during the week has not been brisk; it has, therefore, been easy to fill current requirements. *Copper*.—The Berlin market is quoted at 91 to 97 marks per 50 kilos. English, Australian, Stettin remain steady at 90 to 100. No large dealings have transpired in this city; prices have remained unaltered as follows: Drontheim, 94; Minnesota, 110; and Quincy, 100 marks. *Tin*.—The German markets have been but indifferently supported. At Berlin, Banca has declined to 92 to 93½, and English to 89 to 90 marks the 50 kilos. At Hamburg, Stettin, quoted 96 to 97. There has been no change here. Wagon Lead and English refined between 98 and 100 marks. Lead has been uniformly firm. At Berlin, Tarnowitz, Hartz and Saxonian remain 23 to 30 to 34 marks the 50 kilos. At Stettin German Lead is quoted 34 to 25; Spanish, 27. Here the market has remained steady at 23 7/8 to 24 1/2 marks for German, and 25 50 to 26 English. *Spelter*.—The firms in this metal community are all quiet. At Berlin, Stettin, prices from 94 7/8 to 25 7/8 marks the 50 kilos. There is an extensive export demand at Stettin at 34 to 25. Breslau remains quiet and firm. There are sellers here at 24 3/4 to 24 50 marks.

HOLLAND.

(Koch & Vierboom.)

ROTTERDAM, July 24, 1875.—*The market is* scarce, and holds decline to part with it at anything below 50 guilders. Previously delivery from to-morrow's sale had sold at 49½ to 49¾. Bullion spot, has sold at 47 to 47½; it continues to be offered at 47 without purchasers. September delivery of Bilthou could, we think, be obtained at 46¾. Lead is quiet at 13 guilders.

EAST INDIES.

(Aitken, Spence & Co.)

■ COLUMBO, Ceylon, June 26, 1875.—*Ptumbo*.—The weather has lately been more favorable for preparing operations, but dealers are not augmenting their stocks, which are small, and the demand continues limited. The Marie Louise's cargo has been landed in a damaged condition, and will be sold at 100 per cent. loss. The market has been quiet throughout the past fortnight, and sales have been effected at rates ranging from \$107 to \$115 per picul; just toward the close, however, a sport has taken place in consequence of supplies by the City of Peking being far less considerable than was anticipated, and prices suddenly advanced to \$123 and \$125 per picul. In distant supplies some business has been done yesterday advanced to \$123 and \$125 per picul. We quote Lead, \$7 45 to \$7 75; Tin, \$23 to \$24 25, and Quicksilver, \$120 to \$125. Exchange on New York, 5 per cent. discount.

CHINA.

(Arnold, Karberg & Co.)

CANTON, June 18, 1875.—*Metals—Lead*.—No business to record. Dealers are offering \$7 60 to \$7 65 for L. B., but there are no sellers at these figures. Lead is still able to find a market at former prices. *Silver*.—The market has been quiet throughout the past fortnight, and sales have been effected at rates ranging from \$107 to \$115 per picul; just toward the close, however, a sport has taken place in consequence of supplies by the City of Peking being far less considerable than was anticipated, and prices suddenly advanced to \$123 and \$125 per picul. In distant supplies some business has been done yesterday advanced to \$123 and \$125 per picul. We quote Lead, \$7 45 to \$7 75; Tin, \$23 to \$24 25, and Quicksilver, \$120 to \$125. Exchange on New York, 5 per cent. discount.

Our English Letter.

Review of the British Iron, Steel, Metal and Hardware Trades.

(From our Regular Correspondent.)

SHEFFIELD, ENGL., July 26, 1875.

THE FLOODS

have again descended since I last put pen to paper on your behalf, and have literally covered the "face of the earth" with their accumulated waters in most of the valleys and low lying localities. In the Southern, Eastern and South Midland districts the havoc wrought by the protracted rains is very serious indeed, and threatens to prejudice the results of the whole cereal and potato harvests. The hay was gathered in some places, but in many others while ricks, or the loose grass as it lay in swathes in the fields, have been carried off by the turbulent overflowing of the brooks and rivers. The corn has naturally fared worse; indeed, reports from Lincolnshire and Cambridgeshire, two of our finest agricultural counties, state that the damage done is incalculable and irretrievable. The wheat and oats were on the point of ripening, and should, in the ordinary course, have been ready for cutting three weeks later. The rains, however, have beaten them down flat, and the heavy crops are now so twisted about that they must necessarily be cut by hand, no machine yet before the public being able to deal with such a complicated state of affairs. The wholesale destruction in many parts of the kingdom has been disastrous, but the weather has now become hot. The consequence of this will be that the wheat "laid" in the manner described above will sprout or mildew, and become, in a great measure, worthless. On the light sandy soils the potatoes will, perhaps, not suffer very greatly, but on rich loam or clay bottoms, where the moisture is still lingering in quantity, the tubers will become what the farmers call "steamed," and they will go bad with the very greatest rapidity. I narrate all this because

THE IRON TRADE

is very mercifully affected by our harvest prospects and results. Given a fine summer, and a sequent abundant harvest, and some benefit to the iron and hardware industries is sure to follow in due course. The contrary agricultural effect produces a corresponding manufacturing depression, particularly when it occurs in conjunction with a similar state of affairs in other parts of the world. Corn has gone up 8/ to 10/ per quarter (two sacks of about 16 to 18 stones each) in the course of the past week, but is now a little steadier pending the cessation of hostilities on the part of Jupiter Pluvius. I cannot, of course, pretend to say with an absolute certainty that the gloominess which I have just referred to is having the effect of causing a still greater depression in the iron and coal trades of the Kingdom, but I do affirm that things appear to grow more ebbed every week. Prices are tumbling down—if I may be permitted to make use of so commonplace an idiom—in all directions, yet the expected buyers don't, and apparently have resolved that they won't, make their appearance. Some of the merchants affect to be possessed of important commissions, and hint mysteriously at what they might do should prices come down another £1 for finished iron, but they do not condescend to details, hence the

majority of the producers begin to lose both faith and heart in the weary waiting for the good time coming. Coming it may certainly be, but it is clearly not nigh, and no signs of its approach can be detected even by the most acute observer. Everything is vague. There are no definite premises wherefrom one might draw useful or hopeful inferences, so that the coal owners and iron manufacturers, being alike in the dark as to the future, continue to put their faith in Providence—and get down their workmen's wages as low as possible.

WRECK OF THE ABBOTSFORD.

The Abbotsford—an unlucky vessel, by-the-by, from the very outset of her career—one of the largest steamers of the American Steamship Company, has come to grief off the Welsh Coast. She ran ashore off Anglesey, on Wednesday last, in the Bay of Cemmes, in a dense fog, which baffled the keen vision of the licensed pilot who had charge of the vessel. She stuck fast on a rock, and the passengers were immediately landed. The Liverpool Post says:

"Hopes were entertained that the Abbotsford would be got off without much injury, and lighters, steamers, and steam pumps were forwarded from Liverpool to her assistance. Unfortunately, these have proved of no avail, a telegram having been received yesterday by Messrs. Richardson, Spence & Co., the owners' agents in Liverpool, informing them that at 1 o'clock yesterday (Friday) morning the steamer heeled over and sank in seven fathoms of water, in which she now lies, with her decks at an inclination of 45°, her bow being dry at low water. At half tide the four main hatchways are out of water, as well as the three forward winches. It is expected, however, that a large portion of the cargo can be saved, and also the ship's gear beyond the bridge. At low water men are engaged removing the cargo. The Abbotsford was built at Port Glasgow, in 1870, was about 1500 tons register, and her engines were 100 horse-power, nominal. The ship and cargo were roughly estimated at £120,000, the value of the ship itself being £20,000. The insurance was principally effected in Glasgow, so that the loss to Liverpool underwriters will be comparatively small. Some London and Paris firms will also be involved. The steamer has been peculiarly unfortunate during the last year or two. Some time ago she came into collision with another vessel shortly after leaving London for Philadelphia, and had to put back to the former port, and while waiting there small pox broke out on board. On a subsequent voyage from Liverpool her screw broke, necessitating the Abbotsford again to return. Had no accident occurred at this time the steamer would have sailed for Philadelphia in the ordinary course on Wednesday next."

THE INFLEXIBLE.

Iron gives the following description of this iron-clad, which is expected to be ready for launching in April next:

"The Inflexible has been succinctly described by her designer, Mr. Barnaby, as a rectangular armored castle, 110 feet in length and 75 feet in breadth, and protected by 24 inches total thickness of iron. The other parts of the ship, which are not armor plated, are simply used as means to float and move this invulnerable iron citadel. Altogether the Inflexible is 320 feet in length and 75 feet in breadth. Her mean draught is 24 feet, and her displacement 11,000 tons. All the longitudinal frames are made of steel. The outer skin plating is three-fourths of an inch in thickness, except the garboard plates on each side of the keel, and here the thickness is increased to thirteen-sixteenths of an inch. The armored castle or citadel, which rises to 10 feet above the water-line of the vessel, will enclose within the protection of its walls the engines and boilers, the two turrets with their four 80-ton guns, the hydraulic loading gear, and the magazines. The armor of the citadel will be of different thicknesses of iron, making, however, with the teak backing—which will vary inversely to the thickness of the plating—a uniform thickness of 41 inches throughout. The backing will be interposed sandwich fashion, the armor alternating with a stroke of wood. The plating at the water level will be 24 inches, in two thicknesses of 12 inches; above the water level it will consist of two thicknesses of 12 inches and 18 inches, while below the water level it will be reduced to two thicknesses of 12 inches and 4 inches. The deck will be formed of iron of a single thickness of 18 inches. The deck will be formed of 1 inch iron, supporting armor plating 2 inches in thickness. The ship proper, being entirely armored, will be divided into no fewer than 127 watertight compartments, containing altogether somewhere about 150 watertight doors, but having none of the armor bulkheads of the Devastation. Other novel features in the design of the ship are the position and extent of the super structures, which are erected upon the deck at either end of the citadel, the position of the turrets and the disposition of the steering gear. The superstructures will be built up along the line of the keel forward and aft of the armored castle, and are intended to afford sleeping accommodation for the officers and crew. The turrets of the Inflexible, however, are placed out of the center, the fore turret being on the port side of the ship, and the after turret on the starboard, so that the four guns can be discharged together in line at an enemy right ahead or on either beam, or in pairs astern and toward every point of the compass. The whole of the steam steering gear is placed below the water line, so that it is impossible that the rudder-head, although unprotected by armor, can be injured by shot or shell during an engagement. The rudder, which is squarely formed, will be worked by a tiller 4 feet 6 inches below water. The prow is a massive and very dangerous looking protuberance, and will be wholly under water. As originally designed, it was made to be removable, being placed in position only in case of war. This arrangement, however, has been revised, and it is now decided to fix it permanently. It has been lately detached for alteration, the curve of the nose having been considered too abrupt. The coils, of which the Inflexible will carry the enormous quantity of 1200 tons, will be stored at the water line along the unarmored sides of the ship, where the missiles of the enemy cannot reach them, and a still more secure place will be found below for more perishable stores. The armor plating will not be placed on the citadel until after the vessel has left the slips and been floated into No. 13 Dock, which is being prepared for her in the extension works. When completed, the Inflexible will have more machinery on board than any craft afloat, not excepting the Thunderer. She will have engines for propulsion, ventilation, hoisting, moving turrets, loading guns, steering, lifting shot and shell, turning capstan, lowering boats, &c., the whole of which will be supplied by the eminent Scotch firm of Elder & Co. She will be a vast floating engine room, and when commissioned will have as her complement 350 officers and men. The expense of her construction is £400,000, making, with her engines, a total cost of £521,000."

THE SCOTCH PIG IRON MARKET.

There has been a good deal of holiday making in Scotland during the past week, consequently the transactions in pig iron have been on a limited scale compared with the few weeks immediately preceding. Warrants have continued steady at from 60/ to 60 9. The shipping total for the week has been 9833 tons, makers' brands having been unaltered in price. There

are now 32,500 tons in Connal's stores. Freights are unchanged, as also is ballast pig iron.

Writing from Glasgow, on Friday night, July 23, Messrs. James Watson & Co. said: "The warrant market during the past week has been very steady, from 60/ to 60 6, cash, closing today buyers at 60 3, sellers 60 6. The demand for makers' iron has also been quiet, with very little alteration in price. Shipments last week were 9833 tons, against 9944 tons in the corresponding week of 1874." We quote:

No. 1.	No. 3.	No. 2.	No. 4.
G. M. B., at Glasgow	61/6	60/	
Gartsherrie	68/6	61/6	
Coltness	69/	64/	
Summerlee	65/	61/	
Langloan	66/6	62/6	
Carnbroe	63/6	61/6	
Calder, at Port Dundas	67/6	61/6	
Glengarnock, at Ardrossan	67/6	62/6	
Eglinton	68/	63/6	
Dalmellington	61/6	59/6	
Shotts	61/6	60/	
Monkland	61/6	60/	
Clyde	60/	60/	
Quarter-Clyde	61/6	60/	

Messrs. John E. Swan & Bros. (Limited) price current of the same place and date gave the following information :

Glasgow Brands.	Furnaces		Prices.
	Burnt	Unburnt	
	Furnaces Out	Furnaces In	
	Out 10.	Out 15.	No. 1. No. 3. No. 4.

* f. o. b. Glasgow, 1/ per ton, extra.

Glasgow Warrants, 3-5 No. 1; 2-5 No. 3, g. m. b., 60/6.

WEST COAST BRANDS—f. o. b. Ardrossan.

Glengarnock	Furnaces		Prices.
	Burnt	Unburnt	
	13	3	68/ 61/ 62/ 63/
Coltness	12	0	68/ 63/ 64/
Summerlee	6	2	65/ 61/ 64/
Langloan	7	1	66/ 61/ 64/
Carnbroe	4	1	61/ 60/ 61/
Calder	2	6	67/6 61/ 64/
Shotts	5	2	68/ 62/ 64/
Monkland	4	1	65/ 61/ 64/
Clyde	3	1	61/ 60/ 61/
Quarter-Clyde	4	1	61/ 60/ 61/

* f. o. b. Glasgow, 1/ per ton, extra.

Glasgow Warrants, 3-5 No. 1; 2-5 No. 3, g. m. b., 60/6.

EAST COAST BRANDS—f. o. b. in the Firth.

Kinnel	Furnaces		Prices.
Burnt	Unburnt		

<tbl_r cells="3

served in bars of cast steel the following variation:

TABLE No. I.		
Natural State.	At Red Heat.	After Tempering.
Length.....	20'00	9'33
Breadth.....	1'00	1'03
Thickness.....	.00	1'03
Volume.....	20'00	21'57

In these bars the length has decreased, and the breadth and thickness have increased; under the influence of interior pressure, the bar behaves like all homogeneous bodies subjected to deformation by the action of an interior force; that is, it tends to approach the spherical form. M. Caron quotes another example of a laminated steel bar.

In this example the tempering has still produced an increase of volume; but contrary to what occurred in the previous case the length increased and the others do not change. The reason of this contrast is evident, and is to be explained by the want of homogeneity in the laminated bar, which is susceptible of extension more easily in the direction of the lamination than in the opposite sense. The longitudinal fibers exceed their limit of elasticity before this limit has been attained in a transverse direction, and the augmentation in volume takes place entirely in the direction of length.

TABLE No. II.		
Natural Condition.	After Temper.	Length.....
Width.....	1'51	1'51
Thickness.....	.370	.370
Volume.....	111'74	114'25

Tempering should only produce the effects above described in homogeneous bodies whose composition does not vary with temperature and pressure.

In steel and other carbured irons the operation of tempering is complicated by the presence of the carbon, the solution of which it partially induces. It is difficult to ascertain whether the augmentation of volume observed in tempered steel is modified partially by this solution; continuing the comparison with the laws regulating the solubility of solids in liquids, it may be supposed that the increase of volume does not arise from this cause, because a solution has never so great a volume as the sum of the volumes of the bodies which compose it.

The solution due to the tempering of the steel produces a body possessing properties other than those characterizing it before tempering; but this body, owing to the rapid cooling, is always under the influence of phenomena which are developed by the operation. The pressure resulting from the two phases of the tempering maintains in solution a part of the carbon which would have been separated by slow cooling; this portion will increase, in proportion to the increased pressure, that is to say, as the tempering has been more rapid.

If a non-homogeneous body is tempered, composed for example of steels carbured in various degrees, the action will become complicated; it would seem probable that when the body is hot the carbon will be distributed irregularly, and that this dissemination will only increase under the influence of the pressure of the exterior cooled surfaces. If we suppose this body to be represented by various tints according to the quantities of carbon which it contains in different parts, the lines of demarcation, instead of being clearly defined as they originally were, will be found blended after tempering.

This phenomenon of the transfusion of carbon through iron or steel that has been raised to a sufficiently high temperature, has long been known. A bar heated with charcoal resolves the carbon at first over it, afterward it penetrates, and if the process of cementation be carried on long enough it will reach the center of the bar.

When pieces of steel of the same quality are tempered in different degrees the carbon is maintained in solution in a higher proportion as the tempering process is more active. To each nature of steel should correspond a degree of temper where the effect produced is a maximum, which would correspond to the point where the temper would induce the solution of all the carbon contained in the steel. If the effort of contraction were the same for all classes of steel the intensity of temper producing this effect ought to increase with the degree of carburization. But the contraction or pressure due to rapid cooling is generally insufficient to produce this result. The more the rapidity of cooling is increased the greater are the changes induced in the steel. The least carburized natures of steel alone are an exception to this rule; beyond a certain point the effect produced by increase of temper becomes nil, and changes in elasticity alone are observed. But in these bodies the limit of elasticity is attained under efforts relatively small, and the temper, by a variation of temperature, does not produce sufficient pressure to solve all the carbon.—Engineering.

(To be continued.)

The Hope Iron Works.

This institution is the latest addition to the list of San Francisco iron works, having just started active operations. Mr. W. W. Hanscom, formerly of the Aetna Iron Works, is proprietor. The works are located on the corner of Minnesota and Santa Clara streets, on the Potrero, and cover a space of 100x300 feet. The main building is 40x100 feet, the machine shop taking up 80 feet, the pattern shop 50 feet and the blacksmith shop 30 feet. The offices and drafting room are at the extreme end of the main building, and are neatly fitted up. The foundry building covers a space of 40x100.

Mr. Hanscom has made a study of the proper arrangement of the works, so as to facilitate operations as much as possible, and make everything convenient for handling. In the foundry is a cupola furnace of six tons capacity, with a No. 5 Sturtevant blower. The pipe leading the air from blower to furnace is much larger than is usually considered proper,

but Mr. Hanscom says by the arrangement he has made, he gets as large a blast as if he used a blower two sizes larger with smaller pipe. Coke is used altogether for smelting purposes, and the screenings for fuel. This is found advantageous, and another industry is utilized.

In the machine shop the machinery is all new and first-class. The tools were made to order by Bement & Son, of Philadelphia, and are the best that could be procured. There are now four lathes in the shop and two on the way, from 12 inches up to 7 feet capacity, to turn from 10 feet up to 24 feet in length. There is also an 8 inch shaping machine and a 12 inch slotting machine. At present the works are run by a 10 horse-power engine for the machine shop and a 4 horse-power engine for the foundry. There are also two drilling machines, a bolt cutting machine, steam hammer, etc.

The shops are all arranged on one floor, to save the trouble of stairs. The buildings are lofty and well ventilated, and the different shops arranged in relative positions to accord with the usual progress of work.

These works have been running only about six weeks, but they already give employment to 25 men, and work is rapidly accumulating. Mr. Hanscom will make a specialty of stationary and marine engines. He has made a study of steam engine progress, and takes the greatest interest in their manufacture and work. He makes a style of vertical engines with a broader base than usual, in which several improvements are combined. The patterns and designs for this engine are now being made in the shop.

At these works there is now a hoisting engine under way for a Washoe mining company's prospecting operations; also a 35 horse power engine for a mine in Idaho. Mr. Hanscom is also building a launch engine which will be exhibited at the coming Mechanics' Institute Exhibition. The launch is 30 feet long by six feet beam. These works will make a specialty of marine machinery of all kinds, and Mr. Hanscom intends turning out some steam launches which will be a credit to California. He has grown up in California, and feels a natural pride in manufacturing articles of this class, which will show that California mechanics can do as well as those elsewhere.

No inconvenience is felt by the distance of the works from business centers. The town is rapidly growing over toward the Potrero, and before many years most of the iron works will probably move in the same direction. Many of the foundry men have talked of moving to the Potrero for some time, but Mr. Hanscom has taken the initiative. The idea he had in starting this shop was that all the shops were doing a great deal of general work and built everything, including engines. If he makes a specialty of engines he is confident that he can build them cheaper than shops which do not.

As good work is required in this line here as in any part of the United States. The people here expect more work out of an engine than is usually the case. In order to compete successfully with other firms, Mr. Hanscom bought the best tools possible, with no regard to cost, and engaged the best workmen, in all departments, that he could procure. With good tools, good workmen, a convenient shop, pride in his work and long experience, he is confident that he can build up a successful business, and turn out work which will reflect credit on himself and our home industries.—San Francisco Scientific Press.

Tests of Rails at the Roane Iron Co.'s Mill.

The Chattanooga Commercial thus describes the testing of rails made by the Roane Iron Co. for the Cincinnati Southern Railroad; these rails are thirty feet in length and weigh sixty pounds to the yard:

The first test was on a four-foot section. Seven and one-half tons pressure, applied by a hydraulic press, deflected the rail less than one-sixteenth of an inch. Fifteen tons gave three-eighths of an inch deflection, and the rail straightened when the pressure was removed, to within less than one-eighth of an inch of a true line.

At the second test a fresh rail was put in the press, and the "first dash" it got ten tons pressure, on the center of a four-foot section.

This was reduced to $\frac{7}{8}$ tons, and the rail was held in the press five minutes—deflection one-sixteenth of an inch. When the pressure was removed, the rail sprang back to within one-hundredth of an inch of a straight line. Next fifteen tons pressure was applied, and the rail held in the press five minutes. It deflected one-half inch, and came back to within three-eighths of an inch of a straight line, when the pressure was removed. A pressure of 23 tons was then applied, and the rail was bent out of line $\frac{3}{8}$ inches. Twenty-five tons bent it $\frac{4}{5}$ inches; and still there were not the slightest signs of breaking, or parting of the fibers. These pressures were all applied to the head, the bottom resting on blocks.

Mr. Bates then had the bent rail turned over and applied the pressure upon the bottom, at the angle. It then took a pressure of 18 tons to break the head through to the stem. Then the stem was broken down to the flange, or bottom; the rail placed on a support, so as to leave the point where it was broken projecting over. Several stalwart colored laborers took hold of the end that lay on the ground, raised it up about 2 feet and let it down again, 13 times, before the bottom was parted. And when this was done a gentleman present said he didn't know which the bottom iron most resembled—second growth hickory or rawhide.

These tests show an iron of most extraordinary bearing power. An examination of the head will convince any experienced iron man that the wearing quality is quite equal to the general tenacity of the rail under pressure. We have doubts if the steel rails contracted for by the trustees of the Cincinnati Southern outwear these iron rails. The head is just as hard as the Bessemer steel. This head is made of muck iron, pure and simple, rolled from blooms, into which no iron enters save the Rockwood pig.

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AUGUSTA, GA., March 3, 1875.
MILLERS FALLS CO.—Enclosed find draft for amount of invoice, January 5. We would have sent the amount before, but did not have an opportunity of trying the Iron Cutter until a few days ago. It is one of the best machines we ever saw.

Yours, truly,
Moore & Co.

Office of the ATHENS FOUNDRY AND MACHINE WORKS, 1
ATHENS, GA., February 18, 1875.

H. L. PRATT, President.—Dear Sirs—Enclosed find draft made payable to your order by Messrs. Childs, Nickerson & Co., in payment for Iron Cutter. We have put our Cutter to good service, and find it cuts readily 1½ round, and 3½ x ¾ square iron. C., N. & Co. are pleased with theirs, say it will save many a blow and cold chisel in their iron house.

We make a satisfactory discount to dealers, and warrant the cutter to do all which we claim for them. Send for prices.

R. NICKERSON, Agent.

Millers Falls Company,
No. 78 Beekman Street, New York,
Sole Proprietors and Manufacturers of the
Barber Self-Fitting Bit Braces, Millers Falls Vises,
Improved Angular and Ratchet Drilling Machines,
TUBE SCRAPERS, FAMILY TOOL CHESTS,
Patent Adjustable Tool Holders, Mitre Boxes, Ratchet
Braces, Breast Drills, etc.

The New Double Screw Parallel "Leg" Vise.



We are now ready to furnish, as the result of more than thirty years' experience, our latest style of Vise—the best yet made. It is stronger than any other, whether of Foreign or of American manufacture, in every part, and holds with a firm grip any jaws and of convenient shape for the workman to get near his work, usually with a file for filing or chipping, instead of the heavy, clumsily formed jaws of the cast iron Single Screw Vises of the common "parallel" type, and which, depending upon slides alone for preserving parallelism, can never be made perfectly parallel, nor are they safe or breaking.

Our New Vise combines all the advantages of the "Parallel" Leg Vise, the strength and lightness, fastening to the floor and bench, and at the same time greatly superior to it: it is always perfectly parallel at all points of opening, and never gets out of line. Enclosed is some general description of the well known Chisel Vise, so long made by us, we have a new, scientific proportioning of all its parts, with our improved metals for their manufacture, obtained so perfect a tool, that we now warrant these Vises for three years from date of manufacture stamped upon each.

The Jaws are of best Tool Case Steel, welded on, file cut and properly hardened. The screw and chain are of the best quality, and are guaranteed to last一百 years.

The lower screw maintains the parallel position of the two jaws, by having exact motion with the upper working screw through the connecting chain which regulates it.

The chain is very accurately made of steels links and rivets, and having no strain of the work upon it, is therefore as durable as all the other parts.

Prices with Special Discounts to the Trade.

No. 1, Jaws 8½ in. x ¾ in. Screws ¾ in. diameter. Lever 9 in. long.	Opens 4½ in.	\$8.00
" 2, " 4½ in. x 1 in. " 1½ in. " 13 in. "	12.00	
" 3, " 5½ in. x 1½ in. " 1½ in. " 16 in. "	17.00	
" 4, " 6½ in. x 1½ in. " 1½ in. " 18 in. "	20.00	
" 5, " 7½ in. x 1½ in. " 1½ in. " 24 in. "	30.00	
" 6, " 8½ in. x 1½ in. " 1½ in. " 26 in. "	34.00	

All sizes of these Vises furnished with Swivel Attachment, at an additional cost of \$1 to \$8. Sold at the General Agencies.

THESE GOODS ARE SOLD BY THE GENERAL AGENTS (with special discounts to the trade).

New York.—Messrs. J. CLARK WILSON & CO.—RUSSELL & ERWIN MANUFACTURING COMPANY.—Messrs. HORACE DURRILL & CO., Boston.—Messrs. GEORGE H. GRAY & DANFORTH, Philadelphia.—Messrs. JAMES C. HAND & CO., Baltimore.—Mr. W. H. COLE.

PATENT BOLT HEADER

Every Railroad Shop, Car Shop, Machine & Bolt Shop, Mower, Reaper & Plow Manufacturer, should have one.

Three sizes of these machines are made, viz :

No. 1 will make bolts from ¼ inch down.

No. 2 " " ½ " " 1½ " " 2½ " "

No. 3 " " 1½ " " 3 " " 3½ " "

The three sizes if run together would require from 2 to 3½ horse-power. The variety of shapes that can be made are only limited by the ingenuity of the owner. A few minutes only are required to make a change from one shape or size to another. All dies are made of the best Cast Steel, and can be rethreaded many times.

For Casting, Casting Heads, Round and Track Bolts, &c., are made at one revolution. Square and Hexagon Heads require from 3 to 5 revolutions.

For Simplicity, Durability and Compactness it has no equal.

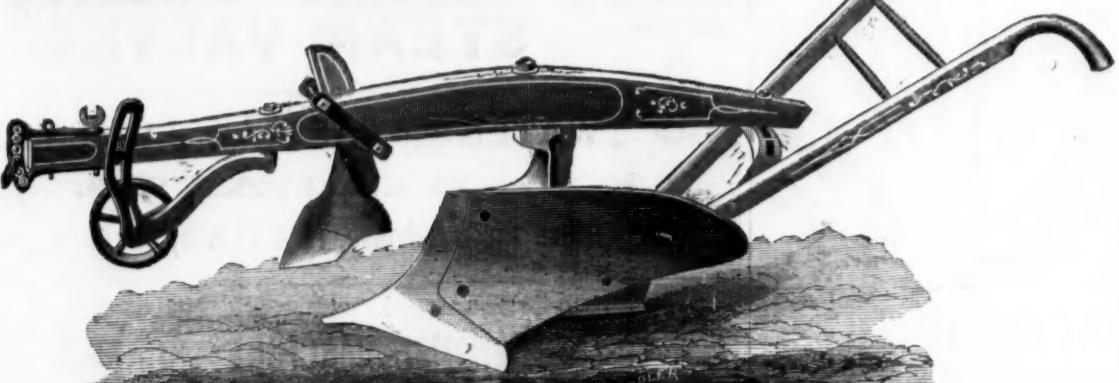
A boy can learn to run it in a few hours. The bolt is made on the heated bar and cut off in the machine to any length from 1 to 10 inches; if greater lengths are desired, they should be cut before heating. Either Round or Square Iron may be used.

Will use up as much iron as can be heated in any ordinary blast fire.

For prices and further particulars, address,

WILLIAM GARDNER'S SONS,
575 Grand & 414 Madison Sts., N. Y.
Sole Agents for THE EMPIRE FILE WORKS,
HAND-CUT FILES AND RASPS.

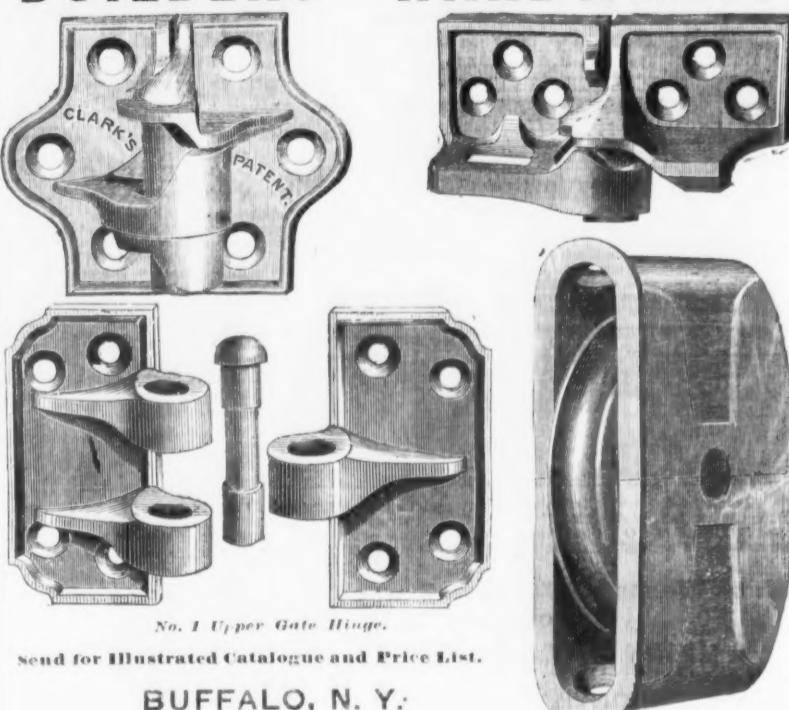
OLIVER'S CHILLED PLOWS.



These implements, though but four years before the public in their present form, show the following remarkable record :
1506 were sold in the season of 1871. 7472 were sold in the season of 1873. 30,000 will be made for the season of 1875.
3049 " " 1872. 14,976 " " 1874. For full descriptive circulars, address,

SOUTH BEND IRON WORKS, South Bend, Ind.

CLARK & CO., MANUFACTURERS OF BUILDERS' HARDWARE.



SEND FOR ILLUSTRATED CATALOGUE AND PRICE LIST.

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MACK & CO.

SUCCESSORS TO
D. R. BARTON & CO.,
At the Old Stand, 136 Mill St., ROCHESTER, N. Y.

Sole Manufacturers of the

D. R. BARTON & CO. BRAND OF



All goods stamped D. R. Barton & Co., are made at the Old Works, and by the old men, from the Best English Steel, manufactured for us by Thos. Firth & Sons and Wm. Jesson & Sons, and fully warranted.

Goods stamped D. R. Barton are not made at the Old Works of the company, but by a new stock company, formed about the time of Mr. Barton's decease.

JOHN C. JEWETT & SONS,

Buffalo, N. Y.

Manufacturers of

Jewett's Patent FIRE SET

Coal Vases

AND

Utility Covered

AND

Tunnel Hods.



Send for Illustrated Catalogue.

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Covered
HODS.



BEST COAL HOD IN THE WORLD.

CAST STEEL CORN HOOKS.

The blades are polished and ground to sharp cutting edge ready for use. The handles are of first-class timber with square end, and are firmly strapped and riveted to the blade, and are as pronounced by the trade the best and most durable article in the market. Packed in barrels of seven dozen each.

Sole Agents for STANDARD RULE CO.'S

Boxwood, Ivory, Ebon, and Patent Party Color



RULES,
Adjustable & Non-Adjustable
PLUMBS & LEVELS.

Their Adjustable Level is the simplest, strongest and most reliable in the market. The Spirit Glass is in a metallic case of such a shape at each end as to exactly correspond and bear easily upon perfect curve of a recess formed in the stock for its reception. The case is secured at each end to the stock by a strong screw. When the level requires adjustment the top plate is removed, one screw is loosened and the other driven until required position is reached. The Plumbeous Glass is arranged on the same principle. The Top Plate protects the adjustment against thoughtless or mischievous persons, the security being well worth the trouble required to remove it when an adjustment is necessary.



Agents for CORB & DREW'S Rivets and Tacks. RIPLEY MFG. CO., Mallets, Mouse Traps, Bung Starts, &c. ATWATER MFG. CO., Carriage Hardware, Clips, Couplings, &c. VALLEY HARDWARE CO., Bow Pins, Bull Rings, Saw Sets, &c. AMERICAN LOCK MFG. CO., Store Door Locks, Padlocks, &c. R. HUMPHREY & CO., Spoons, Ferrules and Tin Washers.

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BAILEY'S PATENT ADJUSTABLE PLANES.
IRON AND WOOD. 30 different styles.. 100,000 ALREADY IN USE.

Smooth Planes,
Jack Planes,
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Jointer Planes,
Block Planes,
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Circular Planes.

[No. 9½ Excelsior Block Plane, \$2.00.]
Manufactured by the STANLEY RULE & LEVEL CO.,
Factories: New Britain, Conn. Warerooms: 35 Chambers Street, New York.



**Ecton Mills Genuine London
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Wrought Iron
PIPE,
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RADIATORS
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STEAM GAUGES, TOOLS,
And all Supplies used by Machinists, &c.

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GEORGE S. FALES,

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Sole Owner and Manufacturer of

OAK BELTING,

Also, Picker or Morcasin Leather, for Boot and Shoe Packs.

Angular Belting and Pulleys made to order.

PAWTUCKET, R. I.

Ask for Star Stamped Lace Leather.

GOLD MEDAL
Non-Extensible Razor Belt.

PATENTED JULY 25, 1871.

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In this strap the liability of the leather to stretch and become loose and porous is prevented by the use of a patented non-extensible base, which supports the leather and secures

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We make this style with single rod, double rod, and wood frames, and intend that it shall, in quality, compare favorably with our other well known brands.

BENJAMIN F. BADGER, Manufacturer,
Badger Place, Charlestown, Mass.

Pipe, Fittings, &c.

WROUGHT IRON INDESTRUCTIBLE ENAMELED PIPE

For Water, Gas, Sewage & Soil Pipe.

Manufactured Solely by

NATIONAL TUBE WORKS CO.,

Also Lap Welded Steam & Gas Pipe & Boiler Tubes.

Tubing & Casing for Artesian, Oil & Salt Wells (with Patent Protecting Coupling).

A Specialty made of Large Wrought Iron Lap Welded Tubes, 8 in. to 14 in. diameter.

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Wrought Iron Pipe & Fittings, Plain and Galvanized PLUMBERS' MATERIALS.

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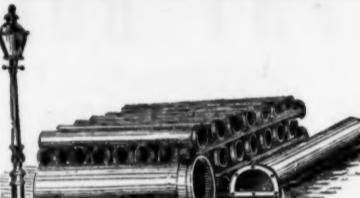
The Acme Pipe Cutter.

MADE ENTIRELY OF SOLID CAST STEEL

Cuts Wrought Iron, Brass and Copper Pipes, Round Iron &c perfectly true without leaving burr on pipe, contracting or splitting it. Cuts out a chip similar to a lathe tool. The knife may be removed and ground. Send for descriptive circular to manufacturers.

Pancoast and Mayle
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WM. ESTERBROOK,
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Manufacturers of
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FOR WATER AND GAS.
Lamp Posts, Valves, &c.,
Mathew's Pat. Anti-Freezing Hydrants.
400 CHESTNUT STREET.

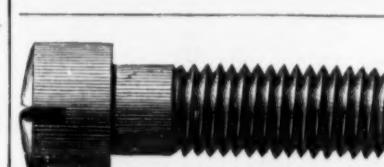
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Sole Agent in the U. S. for
CRAYEN, DUNNILL & CO., (Limited.)

ENCAUSTIC TILES.

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An Event in the Mail Service.

The Cleveland *Trade Review*, in an article on the new postal train from New York to Chicago, says:

"What is recorded as 'the most important event in the history of the railway postal service' occurred last week. It is the success of the negotiation for the express mail between New York and the Mississippi Valley. The train is to start from New York Oct. 1st, at 4 o'clock a. m., reaching Chicago in 26 hours. It will consist of four cars. The first car will be 50 feet in length. It will contain 1000 pigeon holes for the distribution of the letter mail, and boxes sufficient for the distribution of 100 separations of newspaper mail. In this car will be a safe compartment for registered valuable matter, and an office for the chief clerk in charge of the train. The entire letter distribution for the line will be in this car. The second car will be 60 feet long. It will be managed for the distribution of through newspaper mail and for storage. It is estimated that between New York and Chicago 20 tons of mail will be sorted and distributed in this car."

We think there is a little mistake in regard to the 60 foot car. In a recent conversation with Mr. Leander Garey, superintendent of the car department of the New York Central, he spoke to us of this car as a 60 foot car. He was then on his way to meet the agent of the Post-office Department, to see whether it was not possible to reduce the length to 50 feet, so as to enable it to be carried upon four-wheel trucks. Sixty-nine feet is an enormous length for a car, and the extra weight and extra power required to haul the six-wheel trucks would be more than equal, in a fast train, to hauling two 50 foot cars. A heavy car on a fast train would, in such a case, be a great mistake. The car mentioned will not, we judge, therefore, be over 60 feet long, and probably not over 50. The other cars will be each 50 feet long, half of them furnished by the Lake Shore and half by the New York Central.

Starting from New York with the Western mails, the train will arrive in Buffalo in 11 hours, at Cleveland in 15, at Toledo in 18 and at Chicago in 26. It will leave and take mail at every station. It will stop only for wood and water and at the junction of railroads. It will neither carry passengers nor express, nor will it do any business but carry the mails. It will connect with every post-office line between New York and Buffalo. At Buffalo it will overtake the train leaving New York on the Erie road the previous evening, and will receive from it for the West the mails of Northern Pennsylvania, Southwest New York and the tributary country. The train will arrive at Chicago in time for the early out-going trains. The mail will be at Omaha the morning of the second day from New York, and in the afternoon at Kansas City, St. Paul and Minneapolis, and will make direct Pacific coast connections.

Returning, this train will leave Chicago late in the evening, after all the trains are in. It will arrive at New York in the evening, but the mails will be ready for the first morning distribution, before the train arrives at any cities.

Pittsburgh Exposition.—The Pittsburgh *Commercial* says that the contract for the construction of the buildings for the use of the Tradesmen's Industrial Institute, on the river bank, in Allegheny, has been signed; the buildings are to be ready for occupancy on the 1st of October. Messrs. Frazier Bros. are the contractors. It is the intention to have every industry of this great manufacturing center fully represented, that visitors from all parts of the country may comprehend at a glance what we are doing. There are many industries carried on here, of which the country has but a very limited knowledge; and there are thousands of Pittsburghers who would be themselves greatly surprised if they could see, under one roof, samples of all the articles of trade and handicraft produced in this community. Take the various products in iron, steel, copper, brass, tin, and their numerous combinations, and without anything else the display would be wonderfully attractive. Add those of glass, of wood, of stone, of marble, of clay, and the magnitude of the exhibition, as well as its interest, are greatly enhanced. But there are a thousand and one things not included under any of these general heads, all of which may be brought out, if every one will do what he can and ought to do in order to make the exhibition a success.

Americans are proud of their capacity for what they call hard work. They will do any amount of "roughing it" for a while, provided an independent position can be secured by that means. Yet of hard work, in the European sense of the term, they have not the slightest idea. It is only recently that the working hours in England have been reduced to a reasonable limit; while in France, in Germany and in Belgium, men and women still work as many as twelve hours a day, and in small trades like millinery, hair dressing, confectionery and general shop keeping, the hours of labor are even still longer—from eight in the morning till 12 at night in some cases. These habits of hard and constant work influence the whole state of affairs of a country, not only in a direct but in an indirect way, by preventing the development of those habits of luxury and extravagance in the mass of people who, neither from their abilities nor from their position ought to have acquired such habits.

At a meeting of the creditors of the Chicago Plate and Bar Mill, the following statement was submitted:

LIABILITIES.	
Floating indebtedness.....	\$83,000
Mortgage on mills and real estate.....	28,000
	\$111,00
ASSETS.	
Personal property and accounts.....	821,000



Stafford Manufacturing Co.'s STENCIL COMBINATIONS.

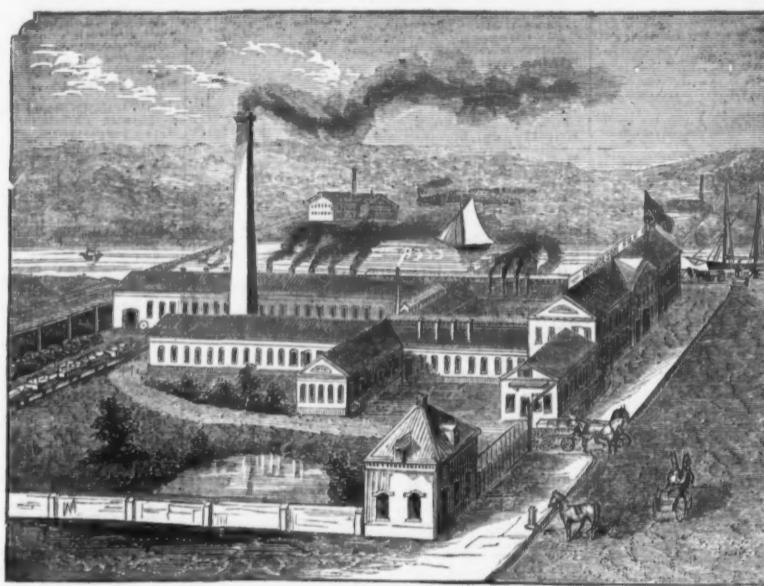
Containing: Stencil Alphabet, Figures, Can Stencil Ink and Brush. For marking boxes, barrels, bags, and packages for shipment. Printing all manner of show cards, notices, signs, numbers, prices, &c., and other purposes too numerous to mention. Instructive and amusing for boys.

WHOLESALE PRICES.

Size, $\frac{1}{2}$ in., per dozen.....	\$6.00	Size, $\frac{3}{4}$ in., per dozen.....	\$10.00
" $\frac{3}{4}$ " "	6.50	" $\frac{3}{4}$ " "	12.00
" $\frac{1}{2}$ " "	7.00	" $\frac{3}{4}$ " "	18.00
" $\frac{1}{2}$ " "	9.00	" $\frac{3}{4}$ " with lower case.....	15.00

An Illustration of sizes sent on application. For sale by Hardware Dealers and Stationers.

No. 66 Fulton Street, New York.



DEALERS AND CONSUMERS

OF FILES

SHOULD PURCHASE THE

Nicholson or "Increment Cut" File

FOR THE FOLLOWING REASONS:

First.—They are made from the best quality of File Steel.

Second.—Each File undergoes a careful inspection after each operation, by critical inspectors, and none but perfect work allowed to pass.

Third.—They are cut by the "Increment" or irregular cut, therefore combine the advantages of both Hand and Machine work.

Fourth.—They will finish finer than Files of any other make of same degree of coarseness.

Fifth.—They will not "pin" or scratch like hand-cut Files.

Sixth.—The "Increment cut" File, by our records, will remove more stock with a given number of pounds applied than any other File with which we are acquainted.

Seventh.—All Files under seven inches are put up in boxes of one dozen each, and neatly labeled.

Eighth.—The large stock carried by us, combined with our superior facilities, enables us to fill the largest orders at the shortest possible notice.

Ninth.—We are constantly making careful tests of our Files by delicately constructed machinery, which automatically records the actual power applied, forward, backward and downward, at each stroke of the File, also the number of strokes, combined with the work performed, enables us not only to judge of the quality of our Steel for wear, but also of the cutting qualities of the File, and the ease (expressed in pounds) with which a given amount of work can be accomplished.

Finally.—Our Files are warranted to be hard, well cut and sound. They are exclusively used by many of the largest Railroads and Machinists in the country—and the vigorous growth of our reputation, not only for making a good article, but of our ability to furnish a good article cheap, is evidenced by the large number of Dealers and Jobbers who are handling our Files exclusively.

NICHOLSON FILE COMPANY, Providence, R. I.

SOLD BY HARDWARE DEALERS GENERALLY.

NEW HAVEN NUT CO.,

MANUFACTURERS OF

HOT PRESSED NUTS

Of Superior Quality of all sizes, both

HEXAGON & SQUARE,

From $\frac{1}{4}$ inch to and including $1\frac{1}{2}$ inch Bolt.

Factory and Office, WESTVILLE, CONN.

SUPPLIES

FOR Railways, Machinists and Amateurs, Gun and Leather Belting, Packings and Cotton Waste, Babbitt Metal.

FINE TOOLS for Machinists and Amateurs; Barnes' Foot Power Scroll Saw; Foot Lathe; all kinds. Sole Agents Baxter Steam Engine, Iron and Wood Working Machinery. Send for Price Lists.

JACKSON & TYLER,
16 German St., Baltimore, Md.

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AND

SAFE DEPOSIT CO.

WAREHOUSES:

FRONT AND LOMBARD STREETS.

IRON STORAGE YARDS:
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Schweitzer Mfg. Co.,

57 Reade Street, New York.



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Continental Locks.

Excelsior Dividers.

Excelsior Calipers.

Axes of the celebrated brands:

"Queen of the Forest."

"Wood Choppers' Pride."

Wetmore's Hatchets.

Tackle Blocks.

Brad Awls and Tools, (in sets.)

SOLE AGENTS FOR

Newbold's Files, Chisels, Plane Irons and Tools.

Baldwin's Solid Cast Steel Carpenters' Hammers, Mining and Blacksmiths' Sledges and Tools.

Davis Level and Tool Co.'s celebrated Patent Adjustable Plumbs and Levels and Inclinometers.

Improved Iron Bench Planes and other Tools.

Chapin Machine Co.'s Boring Machines.

Humphrey & Bartlett's Horse Brushes.

H. Chapin's Son's Rules, Planes, Gauges, Plumbs and Levels, Try Squares, T Bevels, Hand Screws, &c.

IMPORTERS OF

Stubs' Files.

French Coffee Mills, and General Hardware and Cutlery.

A complete and extensive stock always in store.

Catalogues mailed on application.

JAMES HENSHALL, Engineer, Machinist & Blacksmith, 1056 Beach St. PHILADELPHIA.

Drawings made to order. Repairing of all kinds promptly attended to. Blacksmithing executed in all its branches.

Designing & Engraving ON WOOD.

Done in the best manner at the office of *The Iron Age* and *The Metal Worker*.

10 Warren Street, NEW YORK.

Estimates given for Catalogues, Posters, &c.

Isaac F. Eaton.

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OFFICES FOR PROCURING

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Forrest Builders

119 SOUTH FOURTH ST., PHILADELPHIA,

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H. HOWSON, Solicitor of Patents; C. HOWSON, Attorney.

Communications should be addressed to the PRINCIPAL OFFICE PHILADELPHIA.

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PATENTS and TRADE MARKS.

Before the

Courts and Patent Office.

Burke & Fraser,

SOLICITORS OF

PATENTS

37 PARK ROW, N. Y. CITY.

Established 1851. Also Consulting Engineers.

Thomas D. Stetson, No. 28 Murray St., N. Y. Author of Patents, and Scientific Expert in patent cases.

HENRY DISSTON & SONS,

Keystone Saw, Tool, Steel and File Works,

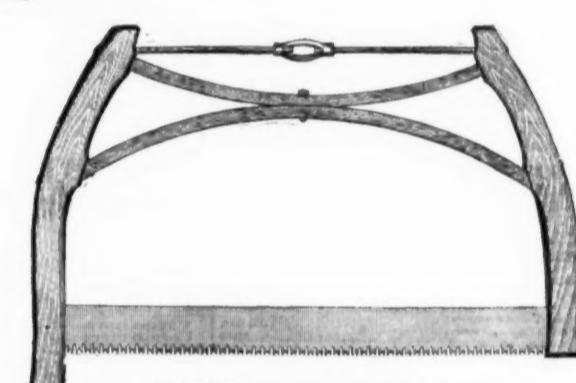
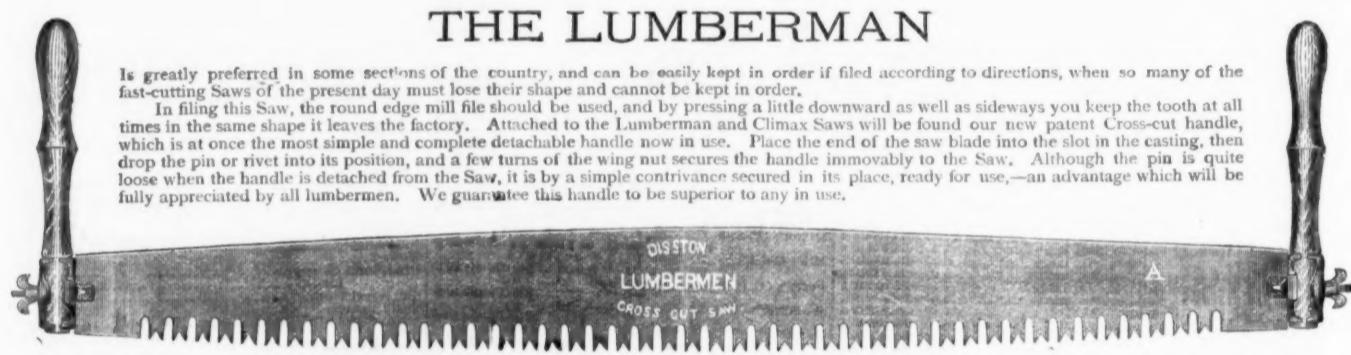
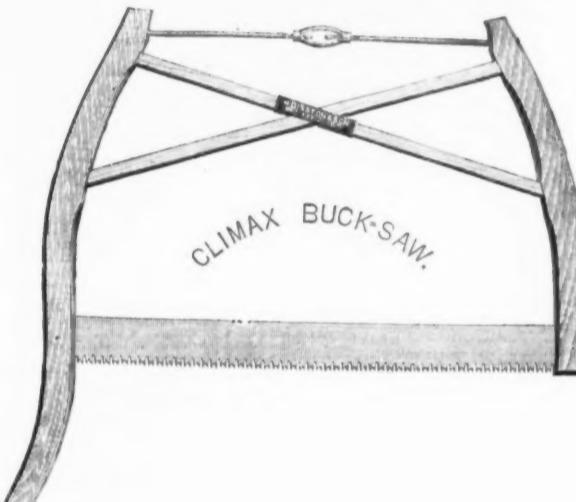
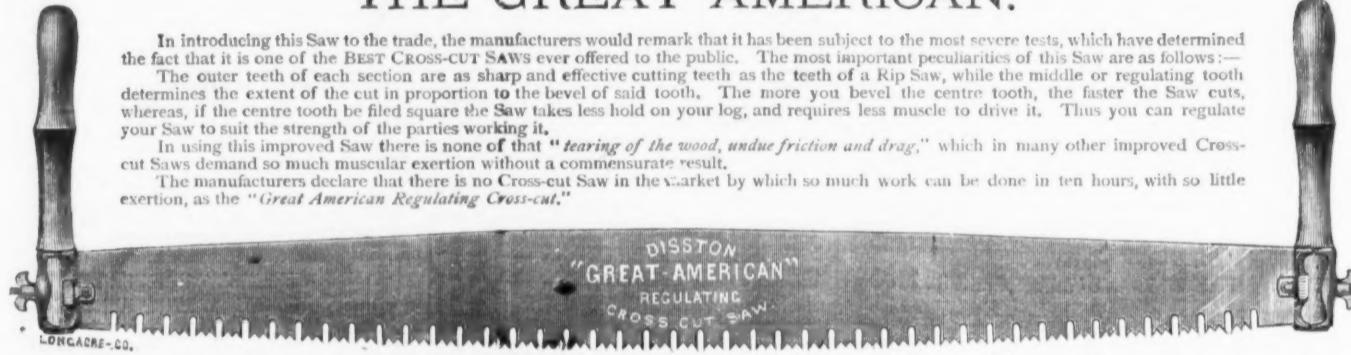
Front and Laurel Streets, Philadelphia.

Branch Works, Tacony, Philadelphia.

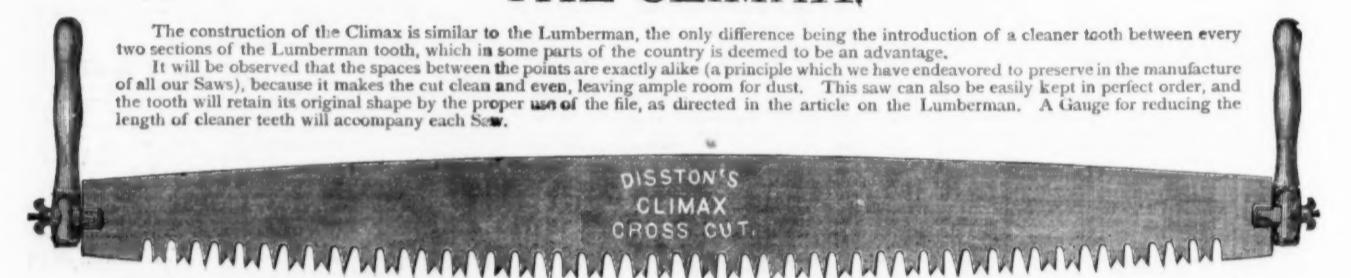
Branch House, Randolph & Market Streets, Chicago, Ill.

Our Celebrated CROSS-CUT AND WOOD SAWS.

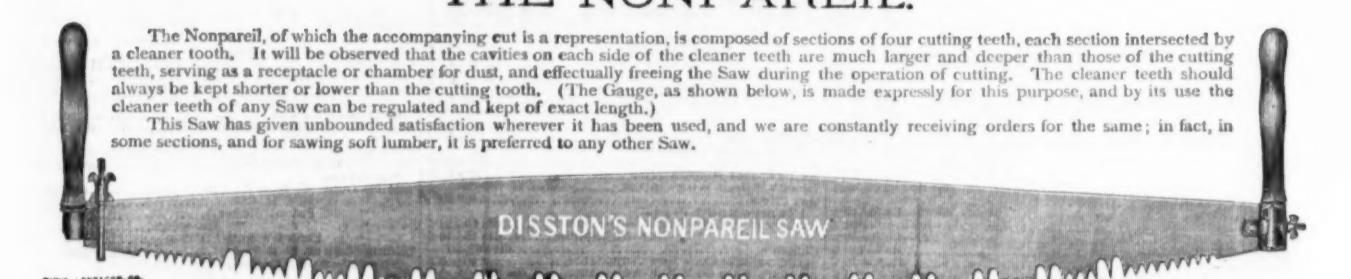
THE GREAT AMERICAN.



THE CLIMAX.



THE NONPAREIL.



GAUGE FOR REGULATING CLEANING-TEETH.



Showing the Gauge in Position for Filing the Cleaning-Tooth.

The Cleaning-Teeth of all Saws should be somewhat shorter than the Cutting-Teeth, and, although shortened, they should be of uniform length throughout. The inner edge of the Gauge rests on the points of the Cutting-Teeth, the Cleaning-Teeth projecting through the opening in center of Gauge. Reduce the projecting points by means of a File, until arrested by the edges of the Gauge, which is made of hardened steel. Thus Tooth after Tooth can be rapidly and correctly reduced to an even length by any unskilled operator.

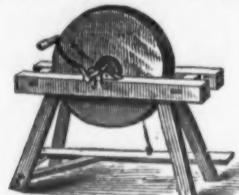
New York Wholesale Prices, August 11, 1875.

HARDWARE.

Aviles.	\$ 14c
Solid Cast Steel.	\$ gold lic; over 250 lbs \$14c; gold
Wright's.	gold lic
Armitage's Mouse Hole	\$ gold lic
Wilkinson's.	\$ gold lic
Eagle Anvils.	\$ 8c
Apple Pt. & Crs.	
Dovetail.	
Table.	
Hudson's.	\$7.75 per doz
Reading.	
Union.	
Skeleton Paring, Coring and Slicing.	\$3.00 per doz net
Bay State, Paring, Coring and Slicing.	\$15.00 per doz
Clinch Slicer.	\$ 800
Augers and Bits.	
Double Cut.	
Yes.	
Geehort French, Swift & Co.	1st quality.....dis 40&10%
Griswold.	
Challenge.	
Nobies Mfg. Co.	dis 40 @ 40 25 g
Cook's.	d's 6x6-10x10 g
Diamond Hardware Co.	dis 22% @ 25 g
Smith Mfg. Co.	dis 10%
Jewett Bit Co.	
Lewis' Single Twist Bits.	dis 25%
Griswold's Patent Bits.	dis 20%
Expansive Bits, Clark's, small, \$18; large, \$26 dis 15%	
" Ives'	\$20 @ 20-30%
" Blake's	dis 40%
Hollow Augers, Small, Ives'.	dis 40 g
" French, Swift & Co.	
" Bonney's Adjustable.	dis 40-25%
" Stearns'	dis 20-25%
" Ives' Expansive.	each \$4-50 dis 10%
" Universal Expansive.	each \$4-50 dis 10%
Double Cut Gimlet Bits, Newell's.	dis 20%
" Douglass'.	dis 20%
" Ives'.	dis 30%
Morse's Bit Stock Drills.	dis 15 @ 20%
H. Hommedieu's Ship Augers.	dis 20%
Watrous Ship Augers.	dis 15%
Vaughan's Post Hole—	6 in. \$20 80; 7, 8 and 9 in. \$25 per doz.
Awls, Brad Sets, &c.	
Awls, Sewing.	per gross \$1-20 dis 10%
Awls, Eye Peg.	per gross 2-25 dis 10%
Palmetto Brad.	per gross 3-10 dis 10%
Shouldered Brad.	dis 25%
Brad Sets, Aiken's.	Nos. 42 and 43.
" Clark's.	dis 40-50%
Stanley's Excelsior.	\$18.50 - 25d x 10
Axes.	
Brooks'.	per doz \$12.00 @ 14.00 net
Blood's.	per doz \$15.00 @ 16.50 - 20%
Horn's.	per doz \$12.50 @ 14.00
Colins'.	per doz 11.00 @ 15.50 net @ dis 5%
Hurd's.	per doz 10.00 @ 12.50
Simmons'.	per doz 10.00 @ 12.50
Morris'.	per doz 10.00 @ 12.50
Red Jacket.	per doz 11.50 @ 13.00
Mount's.	Doane Bittet.
Underhill's.	Crown.
John Leverett's.	
Ten Eyck.	
M. H. Jones & Co.	
Nobies Mfg. Co.	
Elle. hant.	
Axe Grease.—Fraser's.	dis 35%
Balances.	
Pated.	
Iron Kinn.	new list dis 50&5%
Brass (Plated list).	new list dis 50, 10&5%
Orode.	new list dis 50&5%
Bells.	
Hants, Light Brass.	dis 70-10%
Extra Heavy.	dis 40-10%
White Metal.	dis 50-10%
Silver Chime.	dis 15-10%
Swiss.	dis 25%
Globe (Cone's Patent).	dis 15-20%
Gong.	Abber's.
" Yankee.	Barton's.
" Brook's.	Cone's.
Crank, Taylor's.	Conn's.
Lever, Sergeant's.	Clark's.
" Taylor's.	Hart, Bielen & Mead Mfg. Co.
Full.	Brook's.
" Western.	Western.
Call.	
Cow—Common wrought.	dis 20-10%
" Western.	dis 30-10%
" Sargent's.	dis 10-10%
Kentucky Star.	dis 20-10%
" Sargent's.	dis 10-10%
Dodge's Genuine Kentucky, new list.	Nos. 0 1 1 2 3 4 5 6 Hoz.
" \$12.00 10-00 \$10.00 8-00 6-00 5-00 3-50 2-50 1-50 @ 45%	dis 30%
" Yaw's Genuine.	dis 33%
Texas.	
Blacksmiths.	
Moulders.	
Hand Bellows.	
Blind Adjusters.—Domestic.	per doz \$3-10%
Blind Fasteners.	
Mackrell's.	dis 30%
Van Sandt's, No. 2000, \$14.00; No. 300, \$10.50.	net
Washburn's Patent.	per w list net
Merriman's.	
Blind Staples.	
Boardman's Patent, $\frac{1}{4}$ in. and larger.	\$ 37 c
" $\frac{1}{4}$ in.	" 42 c
Blocks.	
Tackle, Hoop and Iron Strapped, Providence Tool Co.'s list.	dis 30%
Burr's.	dis 10%
Stanley Rule and Level Co.	dis 25-10%
Beds.	
Cast Iron Barrel, Shutter, &c.	dis 60-10%
Cast Iron Chain.	dis 50-10%
Wrought Iron Barrel.	dis 50%
" Square.	
" Shutter.	
Wrought Iron Flush, Stanley's.	
Sargent's.	dis 30-10%
Carriage and Tire, Conical.	dis 75%
" Norwegian.	dis 50-10%
" R. B. & W.	(old list) dis 60%
Philadelphia Star.	dis 55%
" Eagle.	dis 55%
" Shelton's.	(old list) dis 60%
Union Nut Company, old list.	dis 60-10%
Stove.	dis 25%
" R. B. & W.	dis 25%
Shelton's Shaved Head.	10c. $\frac{1}{2}$
Borax.	
Boring Machines.	dis 15%
Kellogg's.	
Nobies Mfg. Co., Rice's Patent.	dis 20%
" Regular.	dis 10%
Douglas Mfg. Co.	No. 5, \$3.25; with Augers, \$4.00 net
No. 2, 4.00.	6.00 net
Pair.	dis 30-10%
Phillips' Regular, complete with Augers.	each \$7.25
Molding Machines, \$20.00 each.	dis 30%
How Piv.	
Union Nut Co.	new list dis 50&10%
Hotchkiss'.	dis 50-65%
Humason, Beckley & Co.	dis 50&10%
Sargent & Co.'s.	dis 50-10&10%
Braces.	dis 40&5%
Barber's Patent.	Q. S. Jackson.
Wilson's Co.	Spofford's Patent.
Noble's Patent.	
Ives Novelty.	dis 15-10%
" Handen.	dis 15-10%
Common Ball (American)	dis 60-10-15%
Brackets.—Sheff.	dis 60-10-15%
Bright Wire Goods.	dis 60-10-15%
Bolt Rings.—Union Nut Co., new list, dis 50&10-5%	dis 10%
Sergeant's.	dis 25 in. \$2.25 net
Bush Nut Borers.	dis 20-10%
Common and Ring.	dis 10-10%
Ives' Tung Borers.	dis 10-10 @ 25%
Enterprise Mfg. Co.	dis 20%
Batcher's Cleavers.	dis 20-10%
Bumason & Beckley Mfg. Co.	dis 25%
Bradley.	dis 20%
Beatty.	dis 25%
" 3 in. \$2.25 net	
Bush Nut Borers.	dis 20-10%
Common and Ring.	dis 10-10%
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" 3 in. \$2.25 net	
Bush Nut Borers.	dis

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Walter R. Wood,
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Established 1839.
Regd. U. S. Pat. Off. Mar. 23, 1869.

in 1839.

Registered March 23, 1874.



We invite the particular attention of the
trade to our New Straight Bar Wrench, widened,
full size of the larger part of the so called
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made with ribs on the inside, having a full
bearing on the front of bar (see sectional view),
making the jaw fully equal to any strain the
bar may be subjected to.

These recent improvements in combination
with the nut inside the ferrule firmly screwed
up flush, against square, solid bearings (that
cannot be forced out of place by use), verifies
our claim that we are manufacturing the
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We would also call attention to the fact,
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and sold as the "Genuine Wrench" by certain
parties who seem to rely upon our improvements
to keep up their reputation as manufacturers,
and although the fact of their imitating our
goods may be good evidence that we manufacture
a superior Wrench, we wish the trade may
not be deceived on the question of originality.
Trusting the trade will fully appreciate our
recent efforts, both in improvements on the
Wrench and in the adoption of a Trade Mark,
we would caution them against imitations.
None genuine unless stamped.

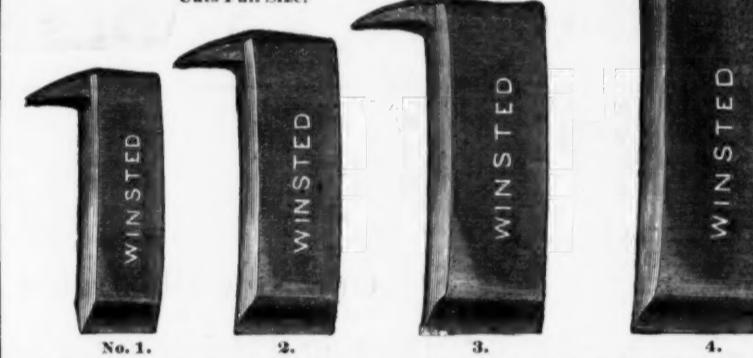
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Every Calk warranted to Harden.

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In calling the attention of the trade to our new Toe Calks, would say that they are strictly
Forged, and are made of the best metal, which we have adopted after careful experiment, as
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obviate the stereotyped complaints against the two prong Calks in weakening the toe of the
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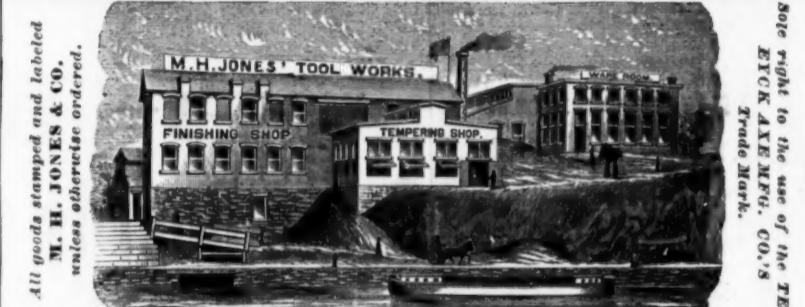
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by far, for the trade
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Give universal satisfaction.

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Acknowledged the Best.

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Everybody that has tried

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"CHAMPION"

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AND PAINTERS' COLORS.



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MADE WHICH HAS A POSITIVE CIRCULATION.

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Prices: 10x1, \$2.90; 14x2, \$9.75; 18x2½, \$20.00; 24x2, \$42.00.
All other sizes at proportionate prices. State diameter of holes in
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For the rapid and perfect grinding of Planer, Paper Cutting,
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These goods unsurpassed for elegance of design, work-
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Manufacturers of Latest Improved Machine Tools, Rotary Sharpeners, two sizes, Iron Planers, all sizes,
Horizontal Drill Attachments, for upright power drills, Self-feeding Portable Drills, hand or power, Expansion
Boring Bars, five sizes, Universal Slide Rest, for taper work, Twist Drill Sharpening Machines, automatic
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Representing MORRIS, TASKER & CO., Philadelphia, Pa.

Manufacturers of
Wrought Iron Pipe, Lap Welded Boiler Tubes, Gas and Steam Fitters

MATERIALS of all kinds.

Agents for Binks Steam Pump, Shiva Governor, Utica Steam Gauge and Keystone Portable
Forge. We handle only M. T. & Co.'s Tubes, which we guarantee to be of standard weight. Every
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**TWO SILVER MEDALS AWARDED
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PHILADELPHIA,
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E NO EXTRA CHARGE FOR
NICKEL-PLATED HOPPERS WITH EAGLE DOME TOPS.
SEND FOR ILLUSTRATED CATALOGUE.

WHEELING HINGE CO.,

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Manufacturers

Wrought Butts, Strap & T Hinges, Wrought Hooks,
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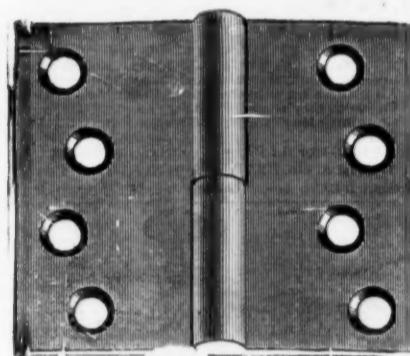
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**BUILDERS'
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New York Warehouse with

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All kinds of
SMALL CASTINGS
Made to order.**GREENFIELD TOOL CO.,**

Greenfield, Mass.

Sole Manufacturers of the Celebrated

"Diamond" PLANE IRONS,

EXTRA PLATED TABLE CUTLERY. PATENT FORGED OX SHOES. The ONLY Shoe made with concavity to fit foot. BENCH AND MOULDING PLANES of every description, &c., &c. Drop Forgings to order. Address for Catalogue with stamp.

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FRANK H. SCUDER.

Middleboro' Shovel Co.,

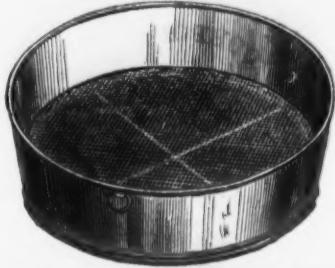
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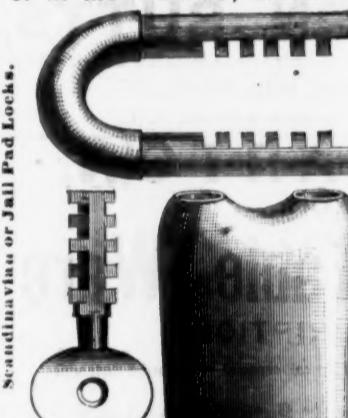
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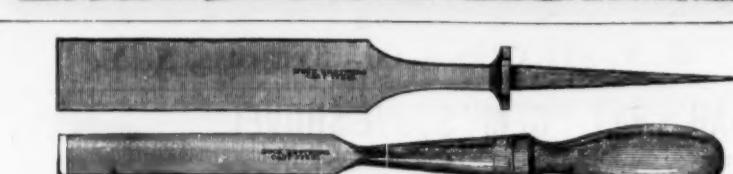
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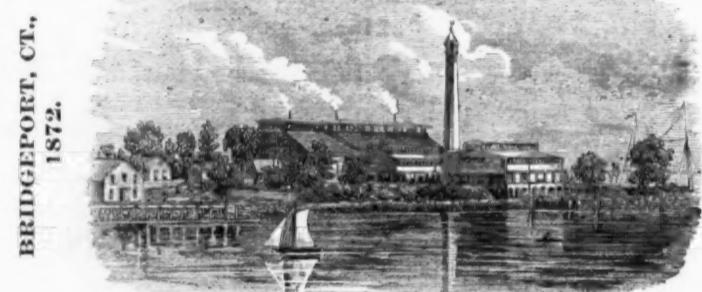
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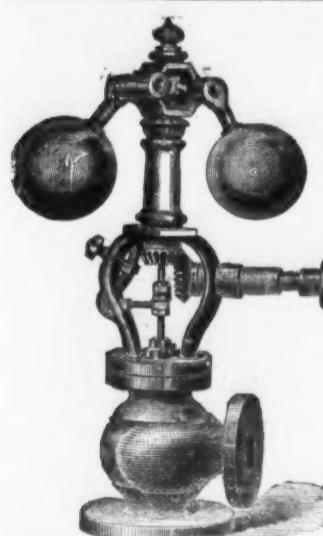
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3"	54.00	56.00	24.00	2.50	7.75
3 1/2"	64.00	66.00	26.00	2.75	8.50
4"	74.00	76.00	28.00	2.75	9.50
4 1/2"	84.00	86.00	30.00	2.75	11.50
5"	94.00	96.00	32.00	2.75	13.50
5 1/2"	104.00	106.00	34.00	2.75	15.00
6"	114.00	116.00	36.00	3.00	16.00
6 1/2"	124.00	126.00	38.00	3.00	17.00
7"	134.00	136.00	40.00	3.00	18.00
7 1/2"	144.00	146.00	42.00	3.00	19.00
8"	154.00	156.00	44.00	3.00	20.00
8 1/2"	164.00	166.00	46.00	3.00	21.00
9"	174.00	176.00	48.00	3.00	22.00
9 1/2"	184.00	186.00	50.00	3.00	23.00
10"	194.00	196.00	52.00	3.00	24.00
11"	204.00	206.00	54.00	3.00	25.00
12"	214.00	216.00	56.00	3.00	26.00
13"	224.00	226.00	58.00	3.00	27.00
14"	234.00	236.00	60.00	3.00	28.00
15"	244.00	246.00	62.00	3.00	29.00
16"	254.00	256.00	64.00	3.00	30.00
17"	264.00	266.00	66.00	3.00	31.00
18"	274.00	276.00	68.00	3.00	32.00
19"	284.00	286.00	70.00	3.00	33.00
20"	294.00	296.00	72.00	3.00	34.00
21"	304.00	306.00	74.00	3.00	35.00
22"	314.00	316.00	76.00	3.00	36.00
23"	324.00	326.00	78.00	3.00	37.00
24"	334.00	336.00	80.00	3.00	38.00
25"	344.00	346.00	82.00	3.00	39.00
26"	354.00	356.00	84.00	3.00	40.00
27"	364.00	366.00	86.00	3.00	41.00
28"	374.00	376.00	88.00	3.00	42.00
29"	384.00	386.00	90.00	3.00	43.00
30"	394.00	396.00	92.00	3.00	44.00
31"	404.00	406.00	94.00	3.00	45.00
32"	414.00	416.00	96.00	3.00	46.00
33"	424.00	426.00	98.00	3.00	47.00
34"	434.00	436.00	100.00	3.00	48.00
35"	444.00	446.00	102.00	3.00	49.00
36"	454.00	456.00	104.00	3.00	50.00
37"	464.00	466.00	106.00	3.00	51.00
38"	474.00	476.00	108.00	3.00	52.00
39"	484.00	486.00	110.00	3.00	53.00
40"	494.00	496.00	112.00	3.00	54.00
41"	504.00	506.00	114.00	3.00	55.00
42"	514.00	516.00	116.00	3.00	56.00
43"	524.00	526.00	118.00	3.00	57.00
44"	534.00	536.00	120.00	3.00	58.00
45"	544.00	546.00	122.00	3.00	59.00
46"	554.00	556.00	124.00	3.00	60.00
47"	564.00	566.00	126.00	3.00	61.00
48"	574.00	576.00	128.00	3.00	62.00
49"	584.00	586.00	130.00	3.00	63.00
50"	594.00	596.00	132.00	3.00	64.00
51"	604.00	606.00	134.00	3.00	65.00
52"	614.00	616.00	136.00	3.00	66.00
53"	624.00	626.00	138.00	3.00	67.00
54"	634.00	636.00	140.00	3.00	68.00
55"	644.00	646.00	142.00	3.00	69.00
56"	654.00	656.00	144.00	3.00	70.00
57"	664.00	666.00	146.00	3.00	71.00
58"	674.00	676.00	148.00	3.00	72.00
59"	684.00	686.00	150.00	3.00	73.00
60"	694.00	696.00	152.00	3.00	74.00
61"	704.00	706.00	154.00	3.00	75.00
62"	714.00	716.00	156.00	3.00	76.00
63"	724.00	726.00	158.00	3.00	77.00
64"	734.00	736.00	160.00	3.00	78.00
65"	744.00	746.00	162.00	3.00	79.00
66"	754.00	756.00	164.00	3.00	80.00
67"	764.00	766.00	166.00	3.00	81.00
68"	774.00	776.00	168.00	3.00	82.00
69"	784.00	786.00	170.00	3.00	83.00
70"	794.00	796.00	172.00	3.00	84.00
71"	804.00	806.00	174.00	3.00	85.00
72"	814.00	816.00	176.00	3.00	86.00
73"	824.00	826.00	178.00	3.00	87.00
74"	834.00	836.00	180.00	3.00	88.00
75"	844.00	846.00	182.00	3.00	89.00
76"	854.00	856.00	184.00	3.00	90.00
77"	864.00	866.00	186.00	3.00	91.00
78"	874.00	876.00	188.00	3.00	92.00
79"	884.00	886.00	190.00	3.00	93.00
80"	894.00	896.00	192.00	3.00	94.00
81"	904.00	906.00	194.00	3.00	95.00
82"	914.00	916.00	196.00	3.00	96.00
83"	924.00	926.00	198.00	3.00	97.00
84"	934.00	936.00	200.00	3.00	98.00
85"	944.00	946.00	202.00	3.00	99.00
86"	954.00	956.00	204.00	3.00	100.00
87"	964.00	966.00	206.00	3.00	101.00
88"	974.00	976.00	208.00	3.00	102.00
89"	984.00	986.00	210.00	3.00	103.00
90"	994.00	996.00	212.00	3.00	104.00
91"	1004.00	1006.00	214.00	3.00	105.00
92"	1014.00	1016.00	216.00	3.00	106.00
93"	1024.00	1026.00	218.00	3.00	107.00
94"	1034.00	1036.00	220.00	3.00	108.00
95"	1044.00	1046.00	222.00	3.00	109.00
96"	1054.00	1056.00	224.00	3.00	110.00
97"	1064.00	1066.00	226.00	3.00	111.00
98"	1074.00	1076.00	228.00	3.00	112.00
99"	1084.00	10			

Machinery, &c.

THE
Shapley Engine

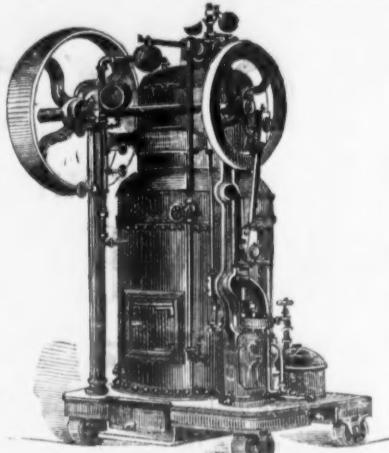
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COMPACT,
PRACTICAL,
DURABLE,
ECONOMICAL.
\$200.00.Cheaper than any Engine offered of
the same capacity.

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Mill Work generally.**Ludlow Valve Mfg. Co.,**

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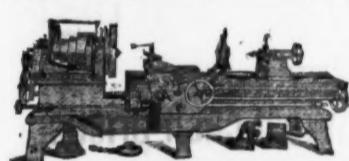
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This Trap automatically drains the water of condensation from Heating Coils, and returns the same to the Boiler whether the Coils are above or below the water level in Boiler, thus doing away with pumps and other mechanical devices for such purposes. Apply to—

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Manufacturers of**ENGINE LATHES,**

From twelve (12) to forty-eight (48) inches swing;

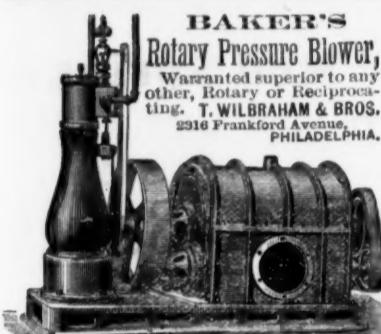
Hand Lathes; Wood Turning Lathes; Vertical
Ortis; Boring Mills; Tapping and Centering
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METALINE.**

Machinery Metalined, or Metaline furnished to Machine Builders.

No oil or attention required. Runs with little or no wear. No dirt or danger from fire. No damage to goods in process of manufacture. Years in use by best concerns, who are refitting old, and ordering new machinery to be metalined.

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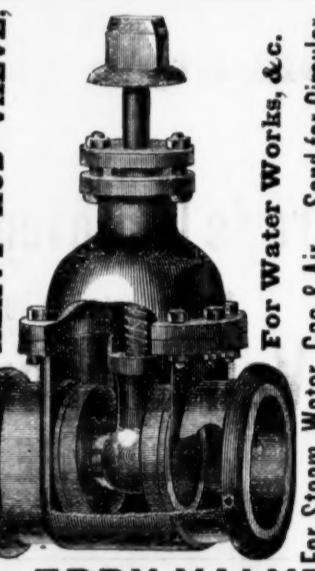
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6 in. from post to center of shaft.MANUFACTURES AS SPECIALTIES,
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SELF-ACTING WOOL SCOURING MACHINES. (Yeudall's Patent.)
Machine and Foundry Work in all their branches. Send for Price List of Pulleys & Shafting.

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ARISING FROM

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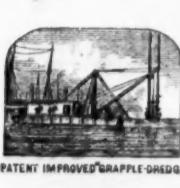
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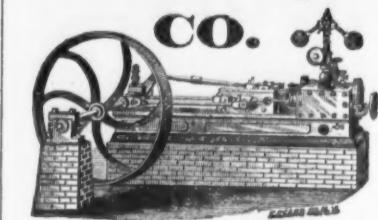
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STATIONARY & PORTABLE
STEAM ENGINESThe best and Most Complete Assortment in
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the shortest notice. We build Engines specially adapted
to the particular uses of our customers, such as Cotton
Gins, Threshers and all classes of manufacturing.We are now building the celebrated Lane's Circular Saw
Mill, the best and most complete saw mill ever invented.We also manufacture a variety of saw Mill Outfits a
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sign, economy and strength.

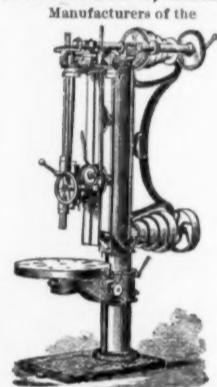
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WORCESTER, MASS.,
Manufacturers of the'BLAISDELL' UPRIGHT DRILLS
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2. Its durability. It will outlast any other article
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XXX Genuine.....	40c	C.....	90c
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X.....	35c	E.....	13c
A.....	30c	F.....	11c
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"Note."—The above are my standard mixtures, and have given satisfaction wherever used, but I am prepared to make Anti-Friction Metal of any quality or mixture desired by the purchaser.

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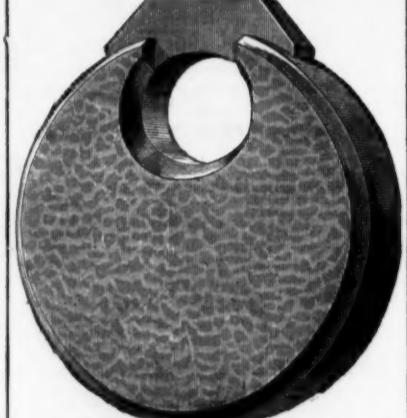
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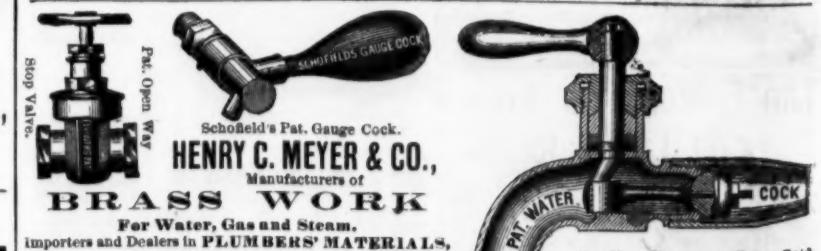
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